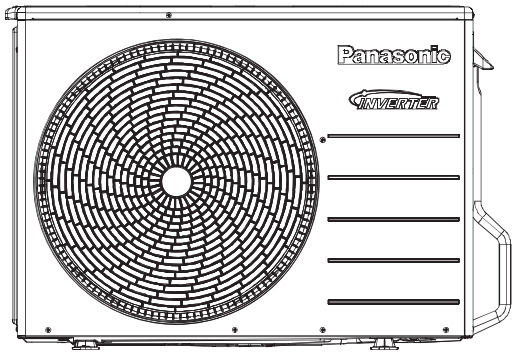
Order No: PAPAMY1307110CE

Service Manual

Air Conditioner



Indoor Unit	Outdoor Unit
CS-HE9PKE	CU-HE9PKE
CS-HE12PKE	CU-HE12PKE
CS-AE9PKE	CU-AE9PKE

Destination
North Europe

⚠ WARNING

This service information is designed for experienced repair technicians only and is not designed for use by the general public.
It does not contain warnings or cautions to advise non-technical individuals of potential dangers in attempting to service a product.
Products powered by electricity should be serviced or repaired only by experienced professional technicians. Any attempt to service or repair the product or products dealt with in this service information by anyone else could result in serious injury or death.

IMPORTANT SAFETY NOTICE

There are special components used in this equipment which are important for safety. These parts are marked by ⚠ in the Schematic Diagrams, Circuit Board Diagrams, Exploded Views and Replacement Parts List. It is essential that these critical parts should be replaced with manufacturer's specified parts to prevent shock, fire or other hazards. Do not modify the original design without permission of manufacturer.

⚠ PRECAUTION OF LOW TEMPERATURE

In order to avoid frostbite, be assured of no refrigerant leakage during the installation or repairing of refrigerant circuit.

TABLE OF CONTENTS

1. Safety Precautions 3
2. Specification 5
3. Features 11
4. Location of Controls and Components 12
4.1 Indoor Unit 12
4.2 Outdoor Unit 12
4.3 Remote Control 12
5. Dimensions 13
5.1 Indoor Unit 13
5.2 Outdoor Unit 14
6. Refrigeration Cycle Diagram 15
7. Block Diagram 16
8. Wiring Connection Diagram 17
8.1 Indoor Unit 17
8.2 Outdoor Unit 18
9. Electronic Circuit Diagram 19
9.1 Indoor Unit 19
9.2 Outdoor Unit 20
10. Printed Circuit Board 21
10.1 Indoor Unit 21

Panasonic®

© Panasonic Corporation 2013.

10.2 Outdoor Unit 23

11. Installation Instruction 24

11.1 Select The Best Location 24
11.2 Indoor Unit 25
11.3 Outdoor Unit 30

12. Operation and Control 33

12.1 Basic Function 33
12.2 Indoor Fan Motor Operation 34
12.3 Outdoor Fan Motor Operation 35
12.4 Airflow Direction 35
12.5 Quiet operation (Cooling Mode/Cooling area of Dry Mode) 37
12.6 Quiet operation (Heating) 37
12.7 Powerful Mode Operation 38
12.8 Timer Control 38
12.9 Auto Restart Control 38
12.10 Indication Panel 39
12.11 nanoe-G Operation 40
12.12 ECONAVI Operation 43
12.13 +8/10°C Heat Operation 47

13. Protection Control 48

13.1 Protection Control For All Operations 48
13.2 Protection Control For Cooling & Soft Dry Operation 50
13.3 Protection Control For Heating Operation 51

14. Servicing Mode 53

14.1 Auto OFF/ON Button 53
14.2 Remote Control Button 54

15. Troubleshooting Guide 55

15.1 Refrigeration Cycle System 55
15.2 Breakdown Self Diagnosis Function 57
15.3 Error Code Table 58
15.4 Self-diagnosis Method 60

16. Disassembly and Assembly Instructions 88

16.1 Indoor Unit 88
16.2 Outdoor Electronic Controller Removal Procedure 93

17. Technical Data 94

17.1 Cool Mode Performance Data 94
17.2 Heat Mode Performance Data 94

18. Service Data 95

18.1 Cool Mode Outdoor Air Temperature Characteristic 95
18.2 Heat Mode Outdoor Air Temperature Characteristic 97
18.3 Piping Length Correction Factor 99

19. Exploded View and Replacement Parts List 100

19.1 Indoor Unit 100
19.2 Outdoor Unit 103

1. Safety Precautions

- Read the following “SAFETY PRECAUTIONS” carefully before perform any servicing.
- Electrical work must be installed or serviced by a licensed electrician. Be sure to use the correct rating of the power plug and main circuit for the model installed.
- The caution items stated here must be followed because these important contents are related to safety. The meaning of each indication used is as below. Incorrect installation or servicing due to ignoring of the instruction will cause harm or damage, and the seriousness is classified by the following indications.

⚠ **WARNING**	This indication shows the possibility of causing death or serious injury.
⚠ **CAUTION**	This indication shows the possibility of causing injury or damage to properties.

- The items to be followed are classified by the symbols:

⃠	This symbol denotes item that is PROHIBITTED from doing.

- Carry out test run to confirm that no abnormality occurs after the servicing. Then, explain to user the operation, care and maintenance as stated in instructions. Please remind the customer to keep the operating instructions for future reference.

	⚠ **WARNING**	
1.	Do not modify the machine, part, material during repairing service.	
2.	If wiring unit is supplied as repairing part, do not repair or connect the wire even only partial wire break. Exchange the whole wiring unit.	
3.	Do not wrench the fasten terminal. Pull it out or insert it straightly.	
4.	Engage authorized dealer or specialist for installation and servicing. If installation or servicing done by the user is defective, it will cause water leakage, electrical shock or fire.	
5.	Install according to this installation instructions strictly. If installation is defective, it will cause water leakage, electrical shock or fire.	
6.	Use the attached accessories parts and specified parts for installation and servicing. Otherwise, it will cause the set to fall, water leakage, fire or electrical shock.	
7.	Install at a strong and firm location which is able to withstand the set's weight. If the strength is not enough or installation is not properly done, the set will drop and cause injury.	
8.	For electrical work, follow the local national wiring standard, regulation and the installation instruction. An independent circuit and single outlet must be used. If electrical circuit capacity is not enough or defect found in electrical work, it will cause electrical shock or fire.	
9.	This equipment is strongly recommended to be installed with Earth Leakage Circuit Breaker (ELCB) or Residual Current Device (RCD). Otherwise, it may cause electrical shock and fire in case equipment breakdown or insulation breakdown.	
10.	Do not use joint cable for indoor/outdoor connection cable. Use the specified indoor/outdoor connection cable, refer to installation instruction CONNECT THE CABLE TO THE INDOOR UNIT and connect tightly for indoor/outdoor connection. Clamp the cable so that no external force will be acted on the terminal. If connection or fixing is not perfect, it will cause heat up or fire at the connection.	
11.	Wire routing must be properly arranged so that control board cover is fixed properly. If control board cover is not fixed perfectly, it will cause heat-up or fire at connection point of terminal, fire or electrical shock.	
12.	When install or relocate air conditioner, do not let any substance other than the specified refrigerant, eg. air etc. mix into refrigeration cycle (piping). (Mixing of air etc. will cause abnormal high pressure in refrigeration cycle and result in explosion, injury etc.).	
13.	Do not install outdoor unit near handrail of veranda. When installing air-conditioner unit at veranda of high rise building, child may climb up to outdoor unit and cross over the handrail and causing accident.	
14.	This equipment must be properly earthed. Earth line must not be connected to gas pipe, water pipe, earth of lightning rod and telephone. Otherwise, it may cause electrical shock in case equipment breakdown or insulation breakdown.	⃠
15.	Keep away from small children, the thin film may cling to nose and mouth and prevent breathing.	⃠
16.	Do not use unspecified cord, modified cord, joint cord or extension cord for power supply cord. Do not share the single outlet with other electrical appliances. Poor contact, poor insulation or over current will cause electrical shock or fire.	⃠
17.	Tighten the flare nut with torque wrench according to specified method. If the flare nut is over-tightened, after a long period, the flare may break and cause refrigerant gas leakage.	⃠
18.	For R410A model, use piping, flare nut and tools which is specified for R410A refrigerant. Using of existing (R22) piping, flare nut and tools may cause abnormally high pressure in the refrigerant cycle (piping), and possibly result in explosion and injury. Thickness or copper pipes used with R410A must be more than 0.8 mm. Never use copper pipes thinner than 0.8 mm. It is desirable that the amount of residual oil less than 40 mg/10 m.	⃠
19.	During installation, install the refrigerant piping properly before run the compressor. (Operation of compressor without fixing refrigeration piping and valves at opened condition will cause suck-in of air, abnormal high pressure in refrigeration cycle and result in explosion, injury etc.).	

⚠ WARNING	
20.	During pump down operation, stop the compressor before remove the refrigeration piping. (Removal of refrigeration piping while compressor is operating and valves are opened condition will cause suck-in of air, abnormal high pressure in refrigeration cycle and result in explosion, injury etc.).
21.	After completion of installation or service, confirm there is no leakage of refrigerant gas. It may generate toxic gas when the refrigerant contacts with fire.
22.	Ventilate if there is refrigerant gas leakage during operation. It may cause toxic gas when the refrigerant contacts with fire.
23.	Do not insert your fingers or other objects into the unit, high speed rotating fan may cause injury.
24.	Must not use other parts except original parts describe in catalog and manual.
25.	Using of refrigerant other than the specified type may cause product damage, burst and injury etc.

⚠ CAUTION	
1.	Do not install the unit at place where leakage of flammable gas may occur. In case gas leaks and accumulates at surrounding of the unit, it may cause fire.
2.	Carry out drainage piping as mentioned in installation instructions. If drainage is not perfect, water may enter the room and damage the furniture.
3.	Tighten the flare nut with torque wrench according to specified method. If the flare nut is over-tightened, after a long period, the flare may break and cause refrigerant gas leakage.
4.	Do not touch outdoor unit air inlet and aluminium fin. It may cause injury.
5.	Select an installation location which is easy for maintenance.
6.	Pb free solder has a higher melting point than standard solder; typically the melting point is 50°F - 70°F (30°C - 40°C) higher. Please use a high temperature solder iron. In case of the soldering iron with temperature control, please set it to 700 ± 20°F (370 ± 10°C). Pb free solder will tend to splash when heated too high (about 1100°F / 600°C).
7.	Power supply connection to the room air conditioner. Use power supply cord 3 × 1.5 mm^2 type designation 245 IEC 57 or heavier cord. Connect the power supply cord of the air conditioner to the mains using one of the following method. Power supply point should be in easily accessible place for power disconnection in case of emergency. In some countries, permanent connection of this air conditioner to the power supply is prohibited. 1) Power supply connection to the receptacle using power plug. Use an approved 15/16A power plug with earth pin for the connection to the socket. 2) Power supply connection to a circuit breaker for the permanent connection. Use an approved 16A circuit breaker for the permanent connection. It must be a double pole switch with a minimum 3.0 mm contact gap.
8.	Do not release refrigerant during piping work for installation, servicing, reinstallation and during repairing a refrigerant parts. Take care of the liquid refrigerant, it may cause frostbite.
9.	Installation or servicing work: It may need two people to carry out the installation or servicing work.
10.	Do not install this appliance in a laundry room or other location where water may drip from the ceiling, etc.
11.	Do not sit or step on the unit, you may fall down accidentally.
12.	Do not touch the sharp aluminum fins or edges of metal parts. If you are required to handle sharp parts during installation or servicing, please wear hand glove. Sharp parts may cause injury.

2. Specification

Model			Indoor	CS-HE9PKE CS-AE9PKE		
			Outdoor	CU-HE9PKE CU-AE9PKE		
Performance Test Condition				EUROVENT		
Power Supply			Phase, Hz	Single, 50		
			V	230		
				Min.	Mid.	Max.
Cooling	Capacity		kW	0.85	2.50	3.00
			BTU/h	2900	8530	10200
			kcal/h	730	2150	2580
	Running Current		A	–	2.20	–
	Input Power		W	170	455	670
	Annual Consumption		kWh	–	228	–
	EER		W/W	5.00	5.49	4.48
			BTU/hW	17.06	18.75	15.22
			kcal/hW	4.29	4.73	3.85
	ErP	Pdesign	kW	2.5		
		SEER	(W/W)	9.1		
		Annual Consumption	kWh	96		
		Class		A+++		
	Power Factor		%	–	90	–
	Indoor Noise (H / L / QLo)		dB-A	39 / 26 / 23		
			Power Level dB	55 / - / -		
	Outdoor Noise (H / L / QLo)		dB-A	46 / - / -		
			Power Level dB	61 / - / -		
Heating	Capacity		kW	0.85	3.20	6.55
			BTU/h	2900	10900	22300
			kcal/h	730	2750	5630
	Running Current		A	–	2.70	–
	Input Power		W	165	575	1.71k
	COP		W/W	5.15	5.57	3.83
			BTU/hW	17.58	18.96	13.04
			kcal/hW	4.42	4.78	3.29
	ErP	Pdesign	kW	3.0		
		Tbivalent	°C	-10		
		SCOP	(W/W)	4.9		
		Annual Consumption	kWh	857		
		Class		A++		
	Power Factor		%	–	93	–
	Indoor Noise (H / L / QLo)		dB-A	42 / 27 / 24		
			Power Level dB	58 / - / -		
	Outdoor Noise (H / L / QLo)		dB-A	47 / - / -		
			Power Level dB	62 / - / -		
Low Temp. : Capacity (kW) / I.Power (W) / COP				4.75 / 1.51k / 3.15		
Extr Low Temp. : Capacity (kW) / I.Power (W) / COP				3.97 / 1.47k / 2.70		
Max Current (A) / Max Input Power (W)				7.7 / 1.71k		
Starting Current (A)				2.70		
Compressor		Type		Hermetic Motor (Rotary)		
		Motor Type		Brushless (4 poles)		
		Output Power	W	900		

Model				Indoor	CS-HE9PKE CS-AE9PKE
				Outdoor	CU-HE9PKE CU-AE9PKE
Indoor Fan	Type				Cross-Flow Fan
	Material				ASG33
	Motor Type				DC / Transistor (8-poles)
	Input Power			W	44.9
	Output Power			W	40
	Speed	QLo	Cool/Fan	rpm	630
			Heat	rpm	730
		Lo	Cool/Fan	rpm	690
			Heat	rpm	800
		Me	Cool/Fan	rpm	890
			Heat	rpm	1000
		Hi	Cool/Fan	rpm	1090
			Heat	rpm	1200
		SHi	Cool/Fan	rpm	1150
			Heat	rpm	1270
Outdoor Fan	Type				Propeller Fan
	Material				PP
	Motor Type				DC / Transistor (8-poles)
	Input Power			W	–
	Output Power			W	40
	Speed	Hi	Cool	rpm	850
			Heat	rpm	850
Moisture Removal				L/h (Pt/h)	1.5 (3.2)
Indoor Airflow		QLo	Cool/Fan	m^3/min (ft^3/min)	6.78 (240)
			Heat	m^3/min (ft^3/min)	8.06 (285)
		Lo	Cool/Fan	m^3/min (ft^3/min)	7.55 (267)
			Heat	m^3/min (ft^3/min)	8.96 (316)
		Me	Cool/Fan	m^3/min (ft^3/min)	9.99 (353)
			Heat	m^3/min (ft^3/min)	11.54 (408)
		Hi	Cool/Fan	m^3/min (ft^3/min)	12.3 (435)
			Heat	m^3/min (ft^3/min)	14.1 (500)
		SHi	Cool/Fan	m^3/min (ft^3/min)	13.46 (475)
			Heat	m^3/min (ft^3/min)	15.01 (530)
Outdoor Airflow		Hi	Cool/Fan	m^3/min (ft^3/min)	33.1 (1170)
			Heat	m^3/min (ft^3/min)	34.0 (1200)
Refrigeration Cycle		Control Device			Expansion Valve
		Refrigerant Oil		cm^3	FV50S (450)
		Refrigerant Type		g (oz)	R410A, 1.37k (48.4)
Dimension		Height(I/D / O/D)		mm (inch)	295 (11-5/8) / 622 (24-1/2)
		Width (I/D / O/D)		mm (inch)	870 (34-9/32) / 824 (32-15/32)
		Depth (I/D / O/D)		mm (inch)	255 (10-1/16) / 299 (11-25/32)
Weight		Net (I/D / O/D)		kg (lb)	10 (22) / 38 (84)
Piping	Pipe Diameter (Liquid / Gas)			mm (inch)	6.35 (1/4) / 9.52 (3/8)
	Standard length			m (ft)	5.0 (16.4)
	Length range (min – max)			m (ft)	3 (9.8) ~ 15 (49.2)
	I/D & O/D Height different			m (ft)	5.0 (16.4)
	Additional Gas Amount			g/m (oz/ft)	20 (0.2)
	Length for Additional Gas			m (ft)	7.5 (24.6)

Model		Indoor	CS-HE9PKE CS-AE9PKE	
		Outdoor	CU-HE9PKE CU-AE9PKE	
Drain Hose	Inner Diameter	mm	16	
	Length	mm	650	
Indoor Heat Exchanger	Fin Material		Aluminium (Pre Coat)	
	Fin Type		Slit Fin	
	Row × Stage × FPI		2 × 17 × 21	
	Size (W × H × L)	mm	636.5 × 357 × 25.4	
Outdoor Heat Exchanger	Fin Material		Aluminium	
	Fin Type		Corrugate Fin	
	Row × Stage × FPI		2 × 28 × 17	
	Size (W × H × L)	mm	36.4 × 588 × 856.3:827.7	
Air Filter	Material		Polypropelene	
	Type		One-touch	
Power Supply			Indoor	
Power Supply Cord		A	Nil	
Thermostat			Electronic Control	
Protection Device			Electronic Control	
			Dry Bulb	Wet Bulb
Indoor Operation Range	Cooling	Maximum °C	32	23
		Minimum °C	16	11
	Heating	Maximum °C	30	–
		Minimum °C	16	–
	+8/10°C HEAT	Maximum °C	10	–
		Minimum °C	8	–
Outdoor Operation Range	Cooling	Maximum °C	43	26
		Minimum °C	16	11
	Heating	Maximum °C	24	18
		Minimum °C	-15	–
	+8/10°C HEAT	Maximum °C	–	–
		Minimum °C	-15	–

1. Cooling capacities are based on indoor temperature of 27°C Dry Bulb (80.6°F Dry Bulb), 19.0°C Wet Bulb (66.2°F Wet Bulb) and outdoor air temperature of 35°C Dry Bulb (95°F Dry Bulb), 24°C Wet Bulb (75.2°F Wet Bulb)
2. Heating capacities are based on indoor temperature of 20°C Dry Bulb (68°F Dry Bulb) and outdoor air temperature of 7°C Dry Bulb (44.6°F Dry Bulb), 6°C Wet Bulb (42.8°F Wet Bulb)
3. Heating low temperature capacity, Input Power and COP measured at 230 V, indoor temperature 20°C, outdoor 2/1°C.
4. Heating extreme low temperature capacity, Input Power and COP measured at 230 V, indoor temperature 20°C, outdoor -7/-8°C.
5. Specifications are subjected to change without prior notice for further improvement.
6. Maximum heating capacity shown are the values based on powerful operation.
7. If the EUROVENT Certified models can be operated under the “extra-low” temperature condition, -7°C DB and -8°C WB temperature with rated voltage 230V shall be used.
8. The annual consumption is calculated by multiplying the input power by an average of 500 hours per year in cooling mode.
9. SEER and SCOP classification is at 230V only in accordance with EN-14825. For heating, SCOP indicates the value of only Average heating season. Other fiche data indicates in an attached sheet.

Model		Indoor	CS-HE12PKE		
		Outdoor	CU-HE12PKE		
Performance Test Condition			EUROVENT		
Power Supply		Phase, Hz	Single, 50		
		V	230		
			Min.	Mid.	Max.
Cooling	Capacity	kW	0.85	3.50	4.00
		BTU/h	2900	11900	13600
		kcal/h	730	3010	3440
	Running Current	A	–	3.90	–
	Input Power	W	170	830	990
	Annual Consumption	kWh	–	415	–
	EER	W/W	5.00	4.22	4.04
		BTU/hW	17.06	14.34	13.74
		kcal/hW	4.29	3.63	3.47
	ErP Pdesign	kW	3.5		
	ErP SEER	(W/W)	8.5		
	ErP Annual Consumption	kWh	144		
	ErP Class		A+++		
	Power Factor	%	–	93	–
	Indoor Noise (H / L / QLo)	dB-A	42 / 29 / 26		
		Power Level dB	58 / - / -		
	Outdoor Noise (H / L / QLo)	dB-A	48 / - / -		
		Power Level dB	63 / - / -		
Heating	Capacity	kW	0.85	4.20	7.75
		BTU/h	2900	14300	26400
		kcal/h	730	3610	6670
	Running Current	A	–	4.00	–
	Input Power	W	165	845	2.28k
	COP	W/W	5.15	4.97	3.40
		BTU/hW	17.58	16.92	11.58
		kcal/hW	4.42	4.27	2.93
	ErP Pdesign	kW	3.8		
	ErP Tbivalent	°C	-10		
	ErP SCOP	(W/W)	4.8		
	ErP Annual Consumption	kWh	1108		
	ErP Class		A++		
	Power Factor	%	–	92	–
	Indoor Noise (H / L / QLo)	dB-A	44 / 33 / 30		
		Power Level dB	60 / - / -		
	Outdoor Noise (H / L / QLo)	dB-A	50 / - / -		
		Power Level dB	65 / - / -		
Low Temp. : Capacity (kW) / I.Power (W) / COP			5.62 / 2.02k / 2.78		
Extr Low Temp. : Capacity (kW) / I.Power (W) / COP			4.65 / 1.92k / 2.42		
Max Current (A) / Max Input Power (W)			10.0 / 2.28k		
Starting Current (A)			4.0		
Compressor	Type		Hermetic Motor (Rotary)		
	Motor Type		Brushless (4-poles)		
	Output Power	W	900		

Model				Indoor	CS-HE12PKE
				Outdoor	CU-HE12PKE
Indoor Fan	Type				Cross-flow Fan
	Material				ASG33
	Motor Type				DC / Transistor (8-poles)
	Input Power			W	44.9
	Output Power			W	40
	Speed	QLo	Cool/Fan	rpm	690
			Heat	rpm	870
		Lo	Cool/Fan	rpm	740
			Heat	rpm	930
		Me	Cool/Fan	rpm	930
			Heat	rpm	1100
		Hi	Cool/Fan	rpm	1130
			Heat	rpm	1270
		SHi	Cool/Fan	rpm	1200
			Heat	rpm	1340
Outdoor Fan	Type				Propeller Fan
	Material				PP
	Motor Type				DC / Transistor (8-poles)
	Input Power			W	–
	Output Power			W	40
	Speed	Hi	Cool	rpm	860
			Heat	rpm	890
Moisture Removal				L/h (Pt/h)	2.0 (4.2)
Indoor Airflow		QLo	Cool/Fan	m^3/min (ft^3/min)	7.55 (265)
			Heat	m^3/min (ft^3/min)	9.86 (348)
		Lo	Cool/Fan	m^3/min (ft^3/min)	8.19 (290)
			Heat	m^3/min (ft^3/min)	10.64 (375)
		Me	Cool/Fan	m^3/min (ft^3/min)	10.7 (378)
			Heat	m^3/min (ft^3/min)	12.82 (453)
		Hi	Cool/Fan	m^3/min (ft^3/min)	13.2 (465)
			Heat	m^3/min (ft^3/min)	15.0 (530)
		SHi	Cool/Fan	m^3/min (ft^3/min)	14.11 (498)
			Heat	m^3/min (ft^3/min)	15.91 (562)
Outdoor Airflow		Hi	Cool/Fan	m^3/min (ft^3/min)	34.4 (1215)
			Heat	m^3/min (ft^3/min)	35.6 (1255)
Refrigeration Cycle		Control Device			Expansion Valve
		Refrigerant Oil		cm^3	FV50S (450)
		Refrigerant Type		g (oz)	R410A, 1.40k (49.4)
Dimension		Height(I/D / O/D)		mm (inch)	295 (11-5/8) / 622 (24-1/2)
		Width (I/D / O/D)		mm (inch)	870 (34-9/32) / 824 (32-15/32)
		Depth (I/D / O/D)		mm (inch)	255 (10-1/16) / 299 (11-25/32)
Weight		Net (I/D / O/D)		kg (lb)	10 (22) / 38 (84)
Piping	Pipe Diameter (Liquid / Gas)			mm (inch)	6.35 (1/4) / 9.52 (3/8)
	Standard length			m (ft)	5.0 (16.4)
	Length range (min – max)			m (ft)	3 (9.8) ~ 15 (49.2)
	I/D & O/D Height different			m (ft)	5.0 (16.4)
	Additional Gas Amount			g/m (oz/ft)	20 (0.2)
	Length for Additional Gas			m (ft)	7.5 (24.6)

Model		Indoor	CS-HE12PKE	
		Outdoor	CU-HE12PKE	
Drain Hose	Inner Diameter	mm	16	
	Length	mm	650	
Indoor Heat Exchanger	Fin Material		Aluminium (Pre Coat)	
	Fin Type		Slit Fin	
	Row × Stage × FPI		2 × 17 × 21	
	Size (W × H × L)	mm	636.5 × 357 × 25.4	
Outdoor Heat Exchanger	Fin Material		Aluminium	
	Fin Type		Corrugate Fin	
	Row × Stage × FPI		2 × 28 × 17	
	Size (W × H × L)	mm	36.4 × 588 × 856.3:827.7	
Air Filter	Material		Polypropelene	
	Type		One-touch	
Power Supply			Indoor	
Power Supply Cord		A	Nil	
Thermostat			Electronic Control	
Protection Device			Electronic Control	
			Dry Bulb	Wet Bulb
Indoor Operation Range	Cooling	Maximum °C	32	23
		Minimum °C	16	11
	Heating	Maximum °C	30	–
		Minimum °C	16	–
	+8/10°C HEAT	Maximum °C	10	–
		Minimum °C	8	–
Outdoor Operation Range	Cooling	Maximum °C	43	26
		Minimum °C	16	11
	Heating	Maximum °C	24	18
		Minimum °C	-15	–
	+8/10°C HEAT	Maximum °C	–	–
		Minimum °C	-15	–

1. Cooling capacities are based on indoor temperature of 27°C Dry Bulb (80.6°F Dry Bulb), 19.0°C Wet Bulb (66.2°F Wet Bulb) and outdoor air temperature of 35°C Dry Bulb (95°F Dry Bulb), 24°C Wet Bulb (75.2°F Wet Bulb)
2. Heating capacities are based on indoor temperature of 20°C Dry Bulb (68°F Dry Bulb) and outdoor air temperature of 7°C Dry Bulb (44.6°F Dry Bulb), 6°C Wet Bulb (42.8°F Wet Bulb)
3. Heating low temperature capacity, Input Power and COP measured at 230 V, indoor temperature 20°C, outdoor 2/1°C.
4. Heating extreme low temperature capacity, Input Power and COP measured at 230 V, indoor temperature 20°C, outdoor -7/-8°C.
5. Specifications are subjected to change without prior notice for further improvement.
6. Maximum heating capacity shown are the values based on powerful operation.
7. If the EUROVENT Certified models can be operated under the “extra-low” temperature condition, -7°C DB and -8°C WB temperature with rated voltage 230V shall be used.
8. The annual consumption is calculated by multiplying the input power by an average of 500 hours per year in cooling mode.
9. SEER and SCOP classification is at 230V only in accordance with EN-14825. For heating, SCOP indicates the value of only Average heating season. Other fiche data indicates in an attached sheet.

3. Features

- Inverter Technology
  - Wider output power range
  - Energy saving
  - More precise temperature control

- Air Purifying System with nanoe-G
  - Deactivates and removes bacterial, viruses and mould

- Environment Protection
  - Non-ozone depletion substances refrigerant (R410A)

- Long Installation Piping
  - Long piping up to 15 meters during single split connection only

- Easy to use remote control

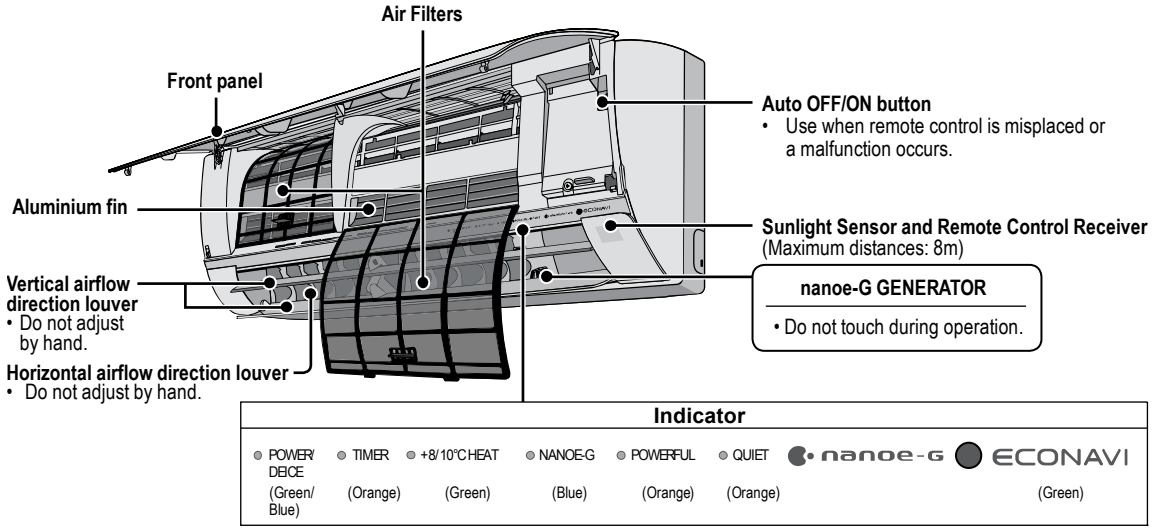
- Quality Improvement
  - Random auto restart after power failure for safety restart operation
  - Gas leakage protection
  - Prevent compressor reverse cycle
  - Inner protector to protect Compressor
  - Noise prevention during soft dry operation

- Operation Improvement
  - Quiet mode to reduce the indoor unit operating sound
  - Powerful mode to reach the desired room temperature quickly
  - 24-hour timer setting
  - +8/10°C HEAT operation is designed to provide heating at low temperature settings. It is used in houses unoccupied during winter, for the purpose of protecting equipment or housing appliances which may be destroyed by extreme cold weather

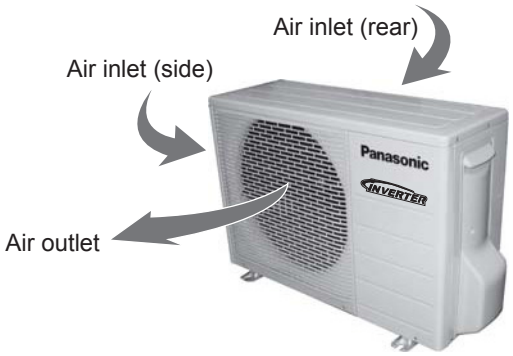
- Serviceability Improvement
  - Breakdown Self Diagnosis function

4. Location of Controls and Components

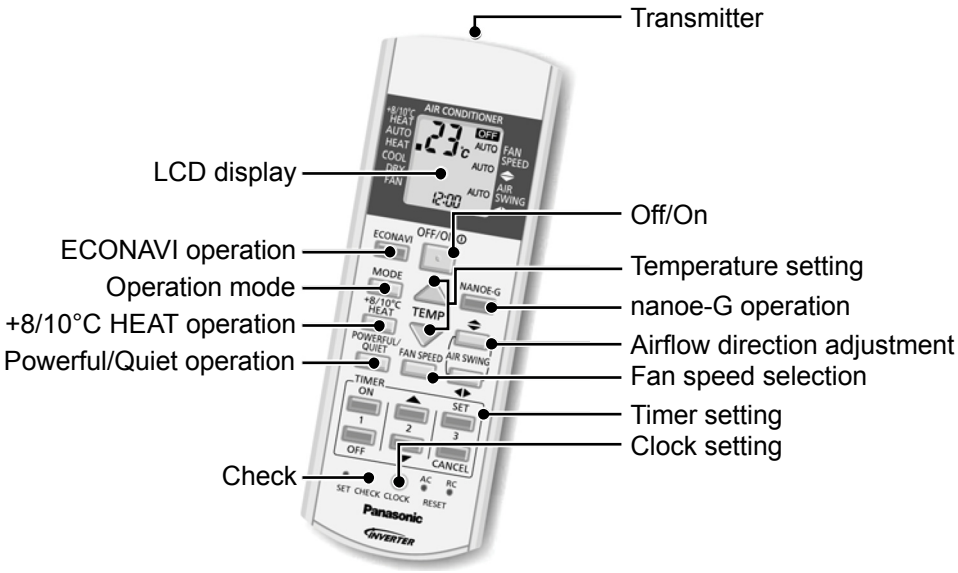
4.1 Indoor Unit



4.2 Outdoor Unit



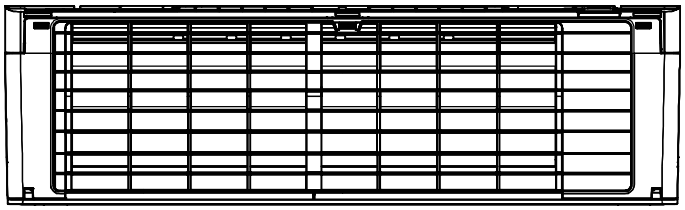
4.3 Remote Control



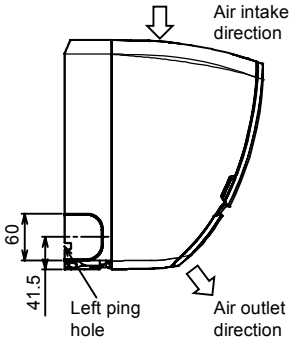
5. Dimensions

5.1 Indoor Unit

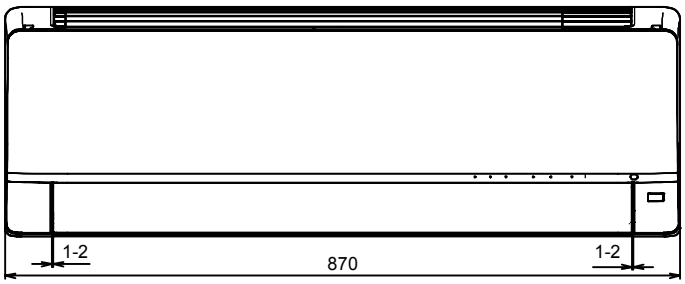
<Top View>



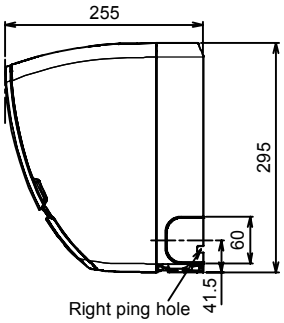
<Side View>



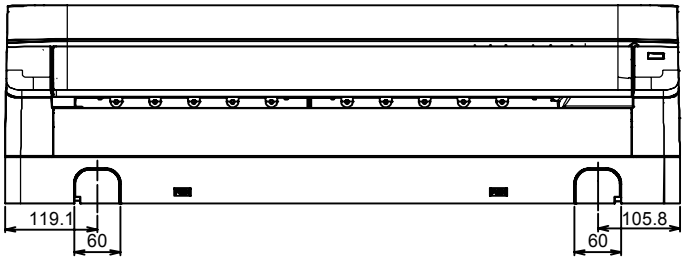
<Front View>



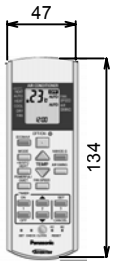
<Side View>



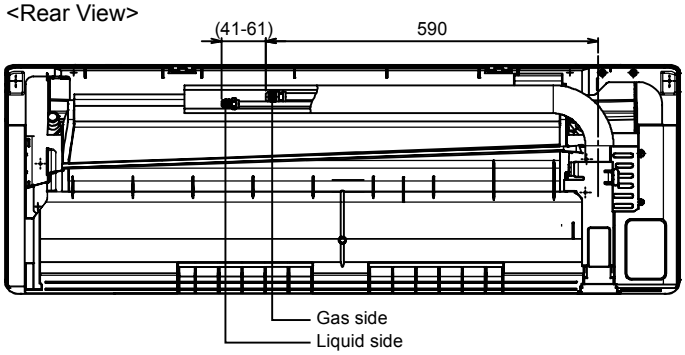
<Bottom View>



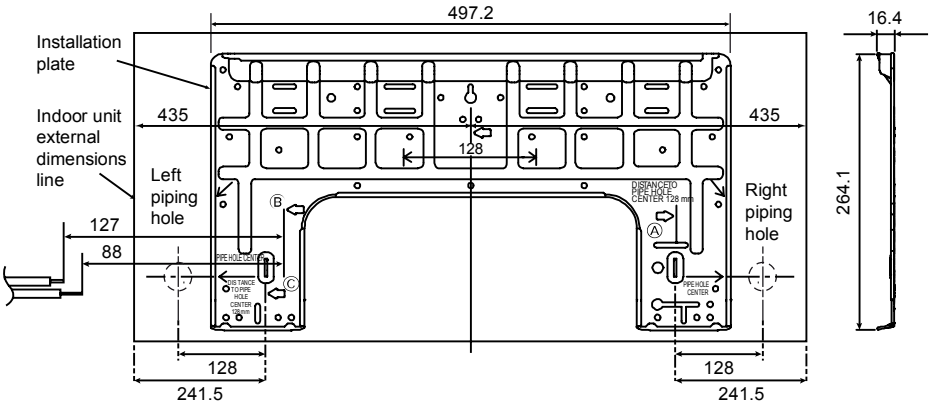
<Remote Control Transmitter>



<Rear View>

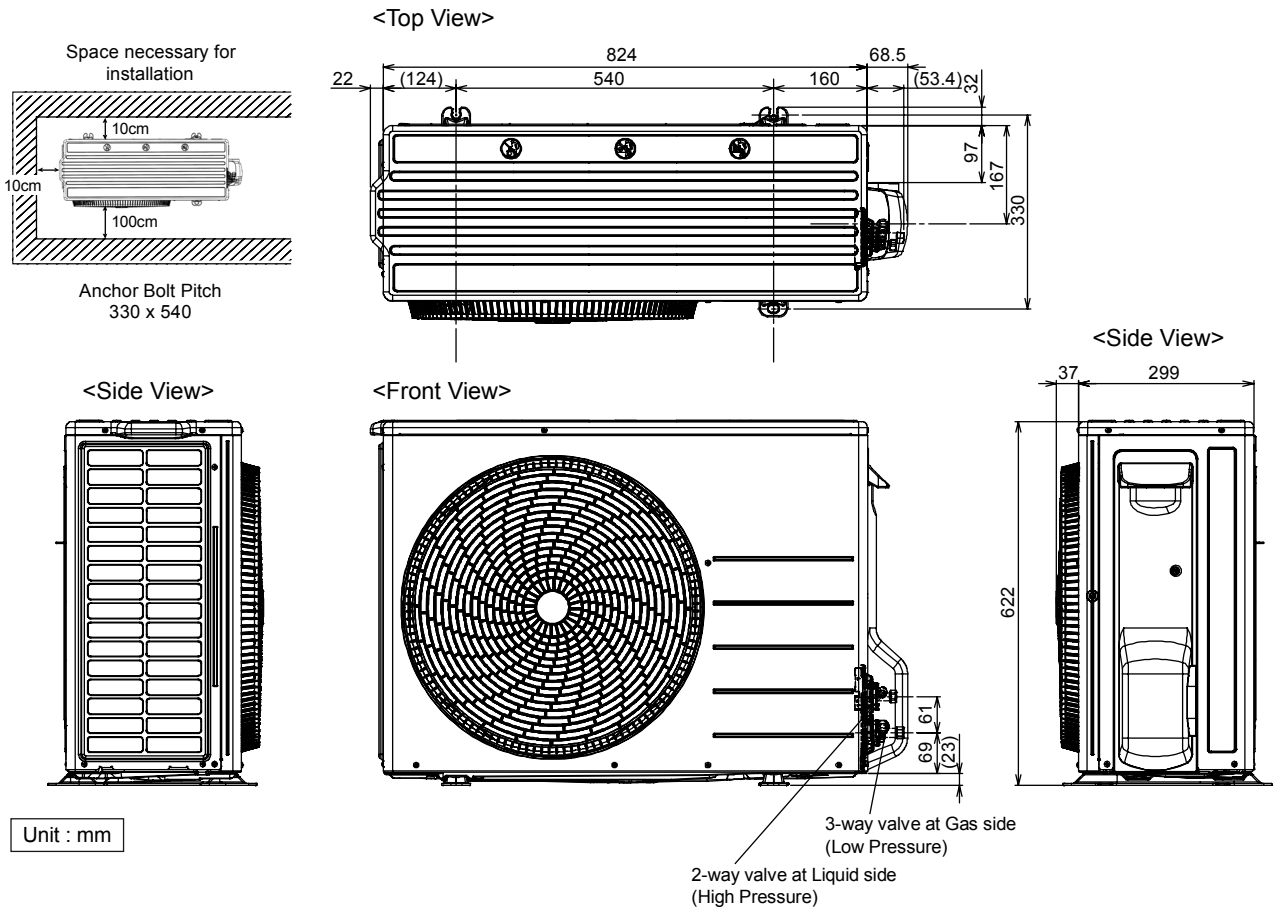


Relative position between the indoor unit and the installation plate <Front View>



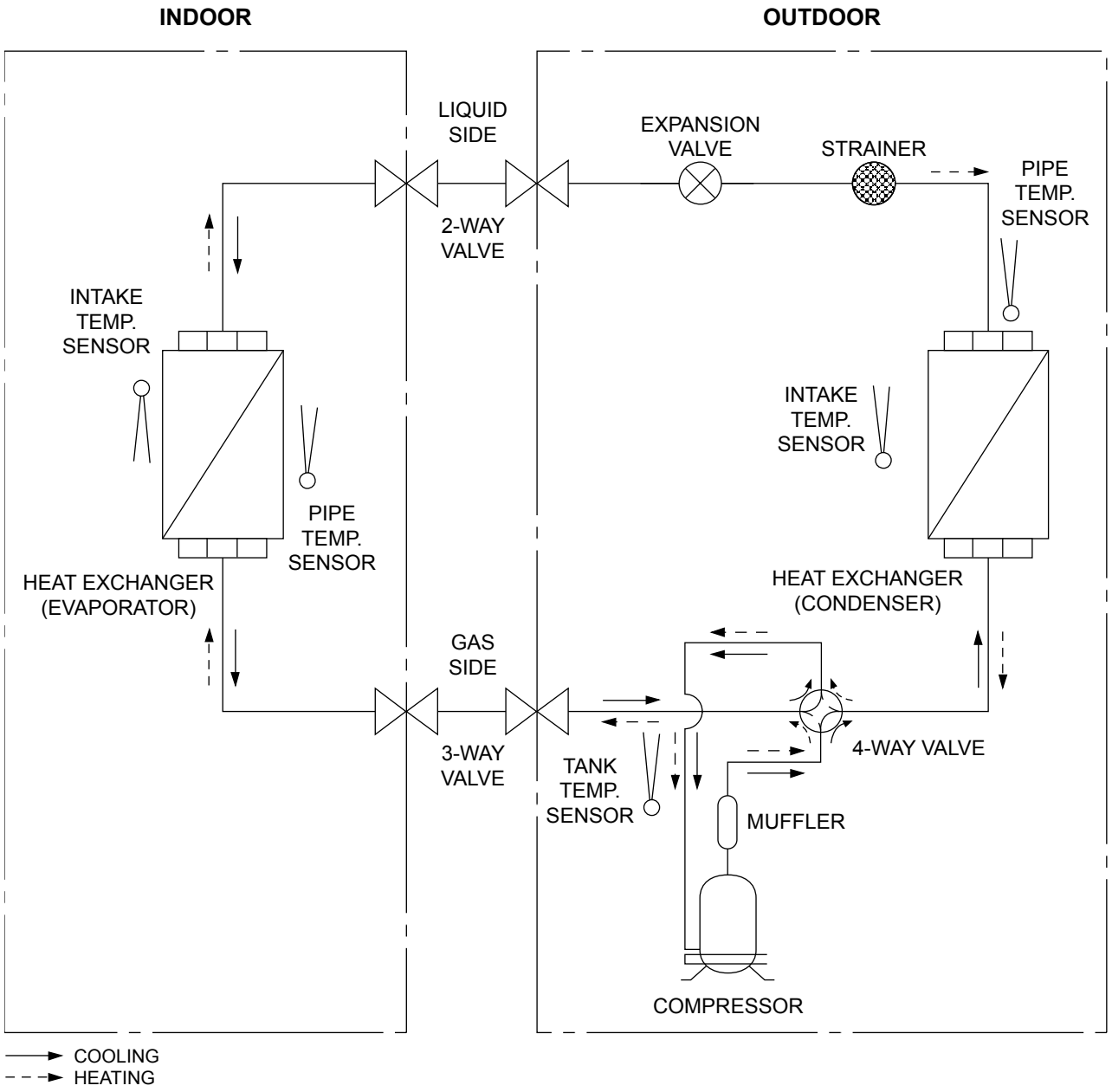
Unit : mm

5.2 Outdoor Unit

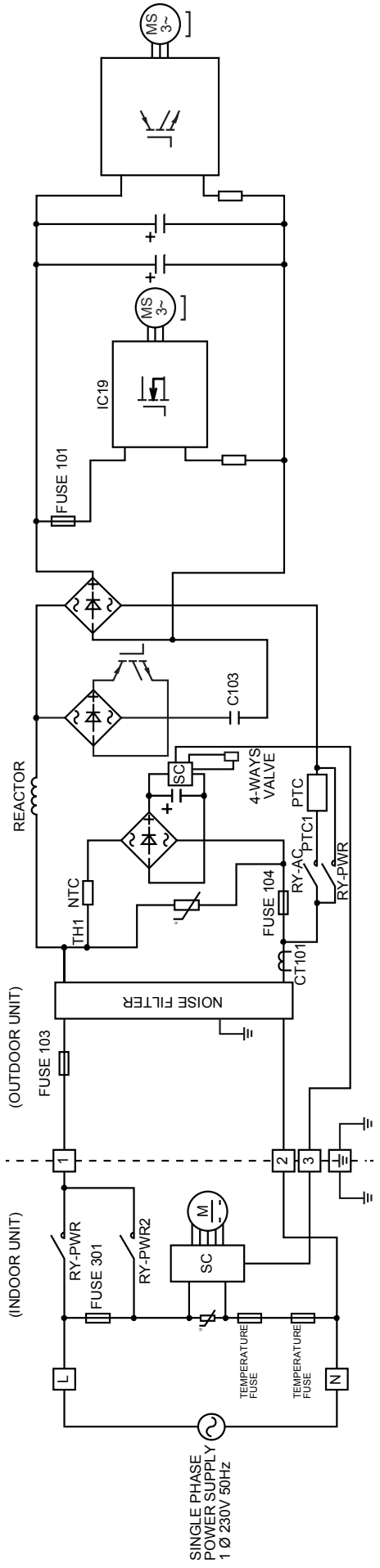


Unit : mm

6. Refrigeration Cycle Diagram

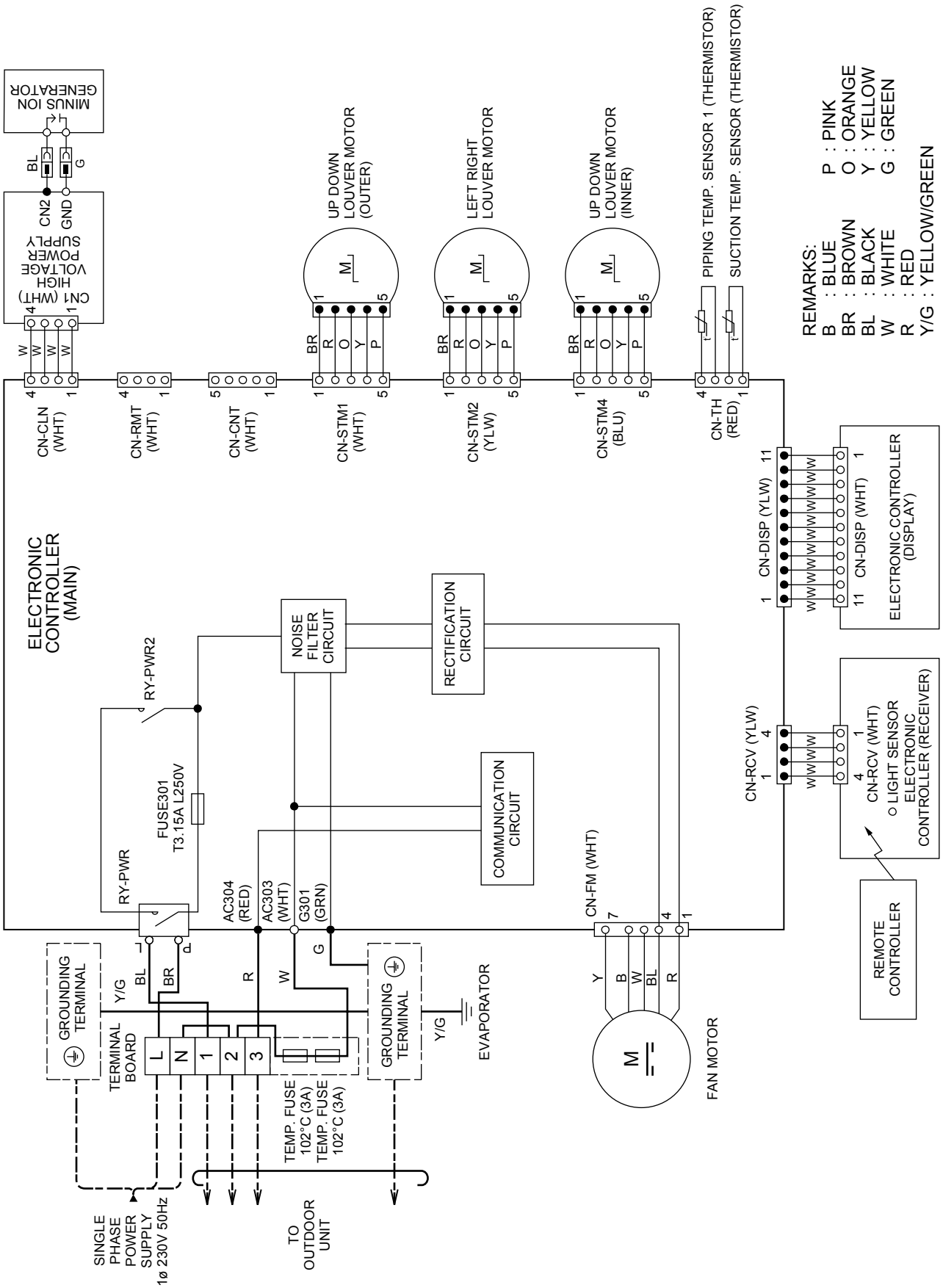


7. Block Diagram

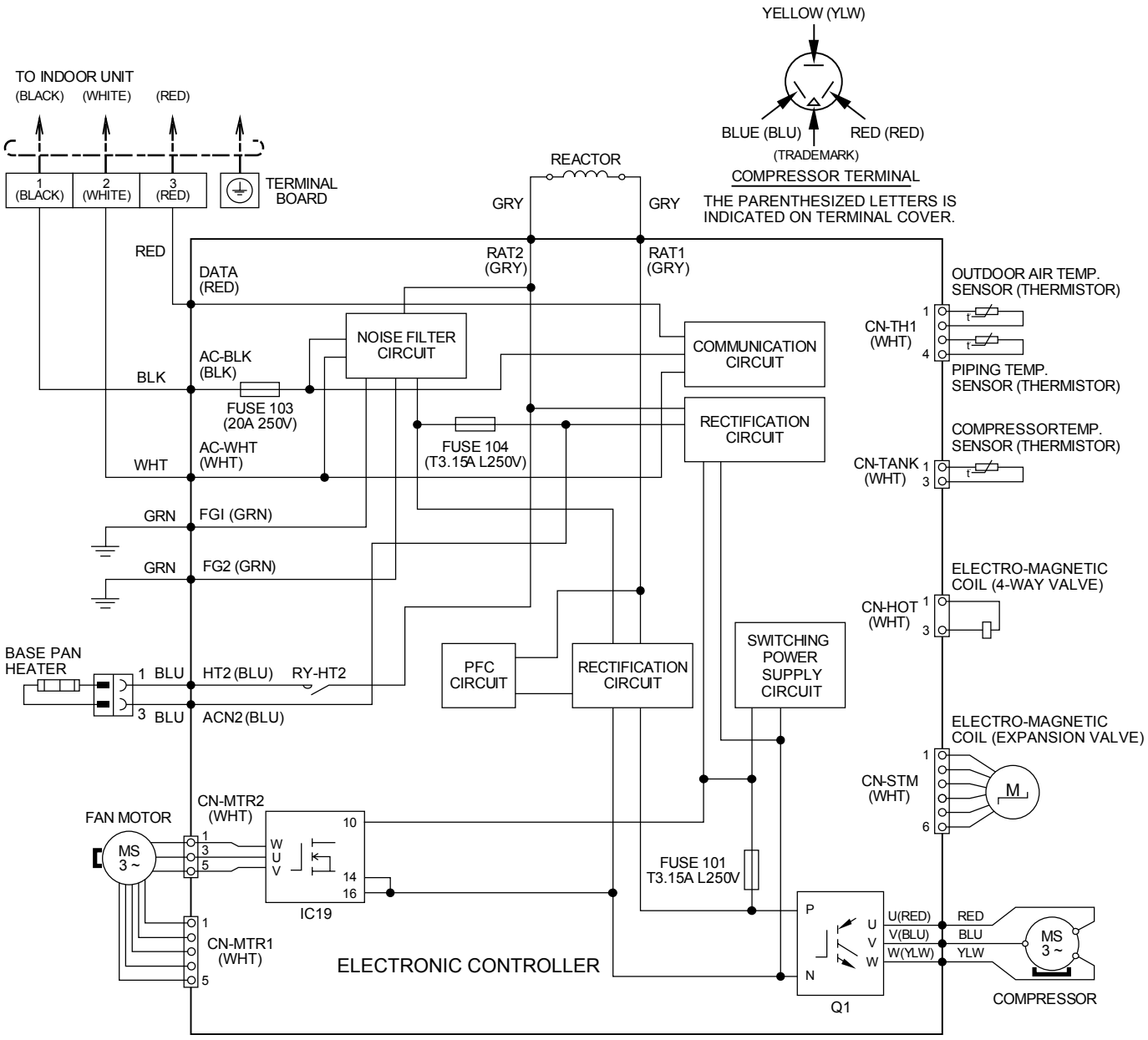


8. Wiring Connection Diagram

8.1 Indoor Unit



8.2 Outdoor Unit



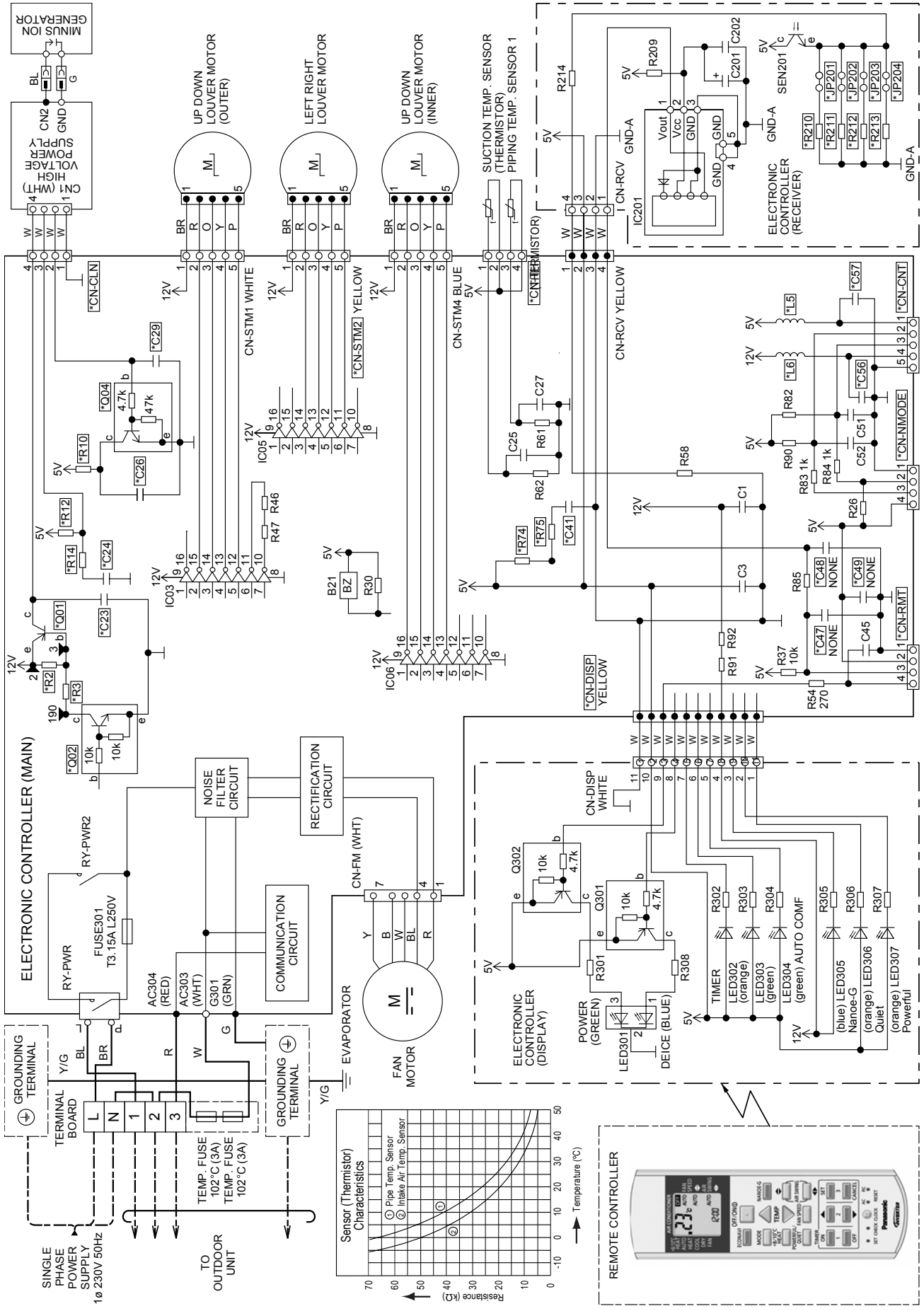
Resistance of Compressor Windings

MODEL	CU-HE9PKE / CU-HE12PKE
CONNECTION	5RD132XBE21
U - V	1.897Ω
U - W	1.907Ω
V - W	1.882Ω

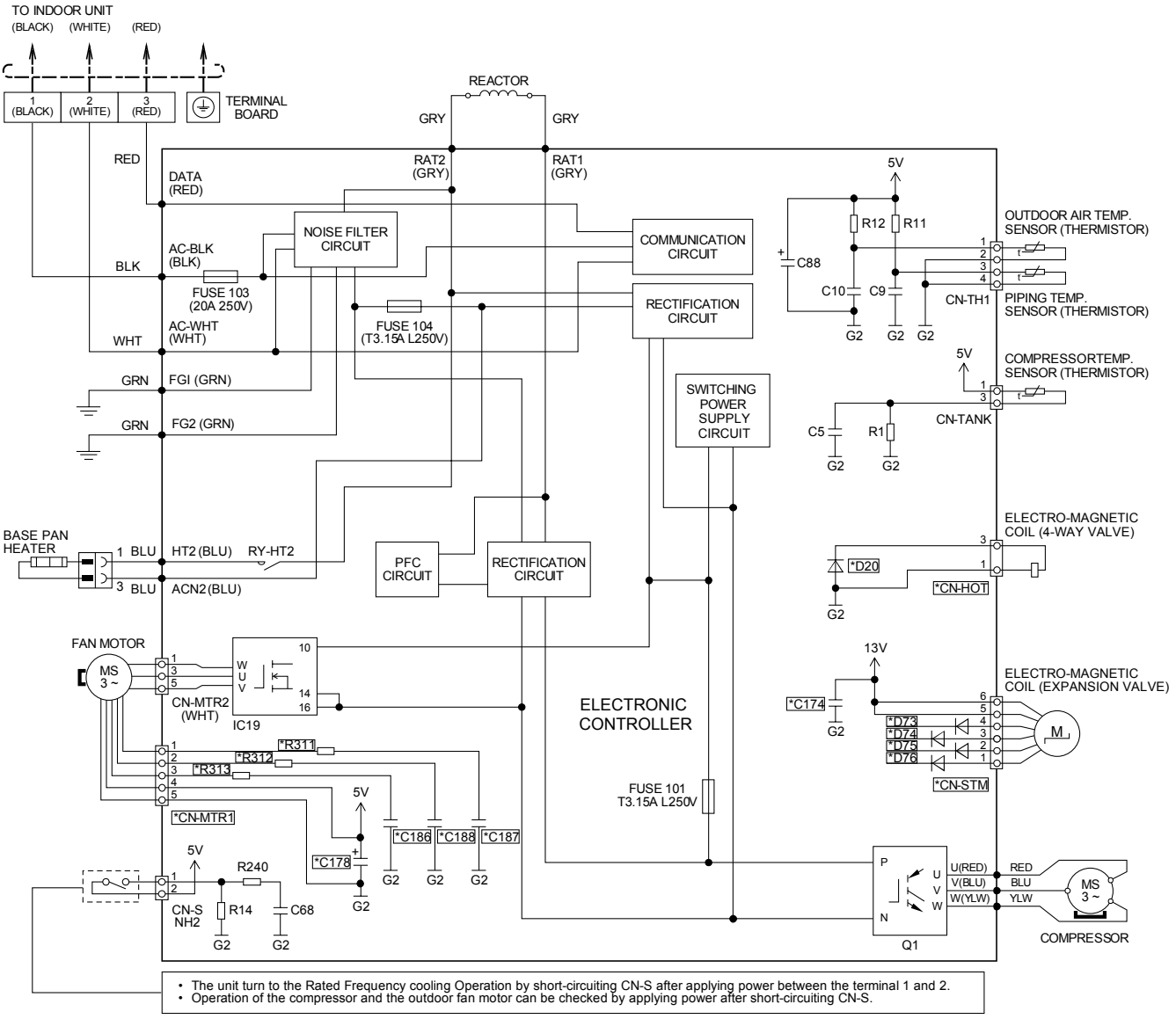
Winding resistance at 20°C.

9. Electronic Circuit Diagram

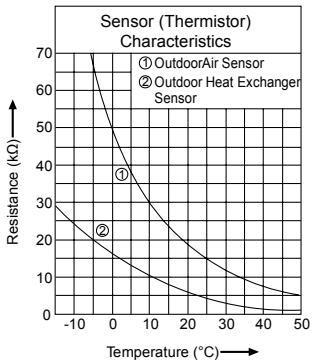
9.1 Indoor Unit

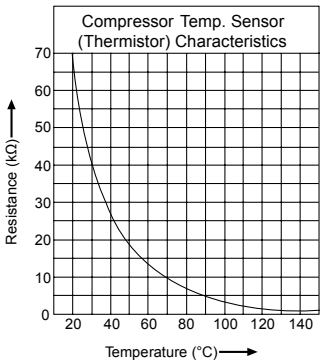


9.2 Outdoor Unit



- The unit turn to the Rated Frequency cooling Operation by short-circuiting CN-S after applying power between the terminal 1 and 2.
- Operation of the compressor and the outdoor fan motor can be checked by applying power after short-circuiting CN-S.

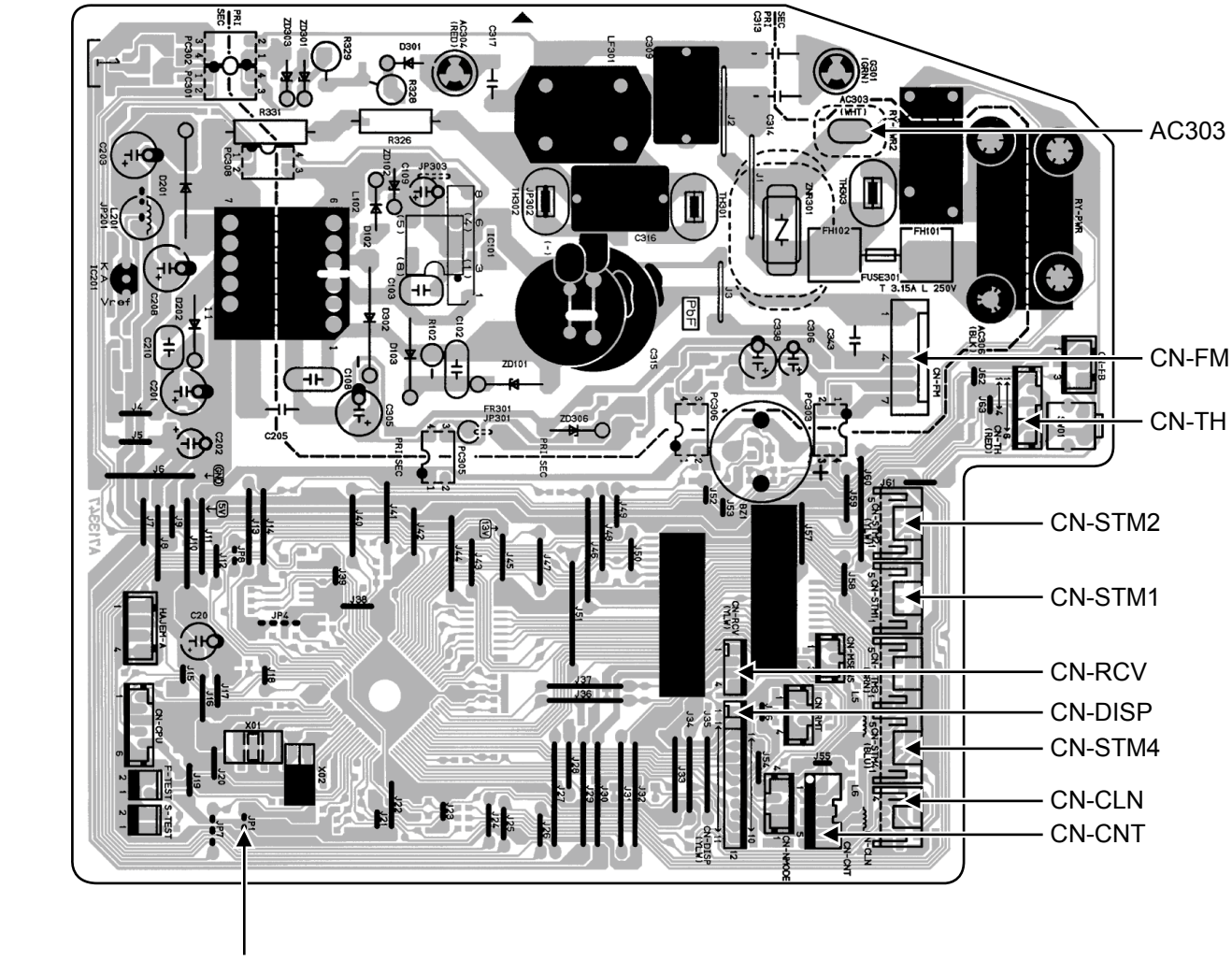




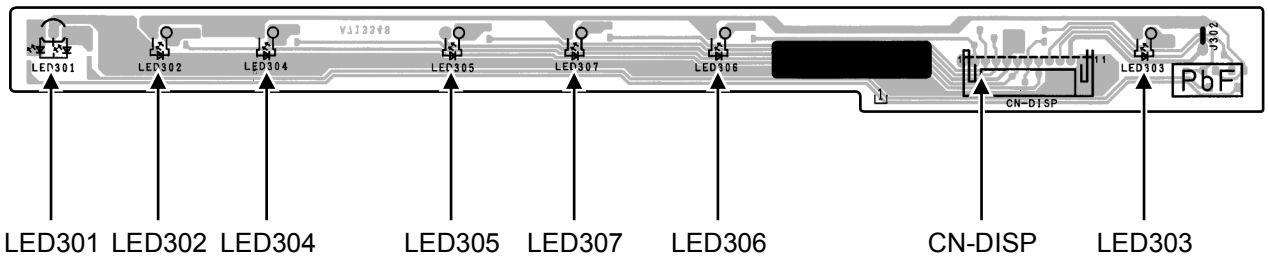
10. Printed Circuit Board

10.1 Indoor Unit

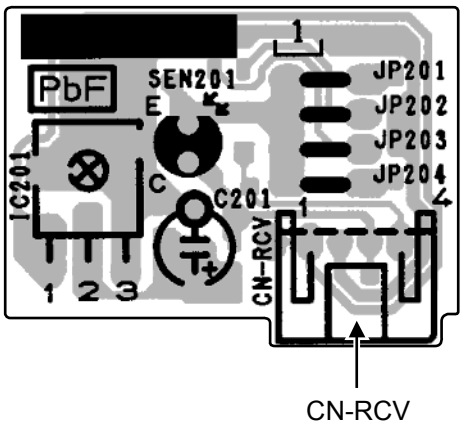
10.1.1 Main Printed Circuit Board



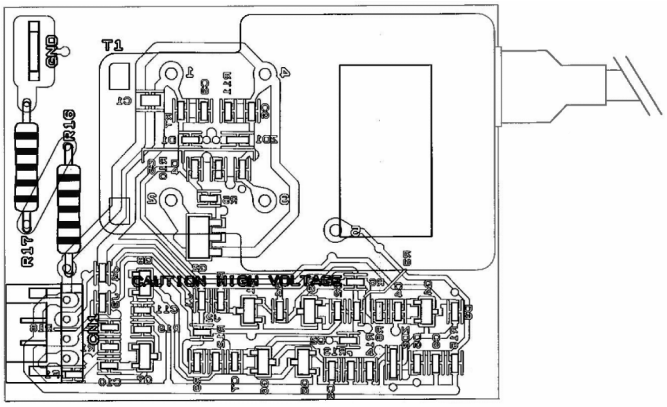
10.1.2 Indicator Printed Circuit Board



10.1.3 Receiver Printed Circuit Board

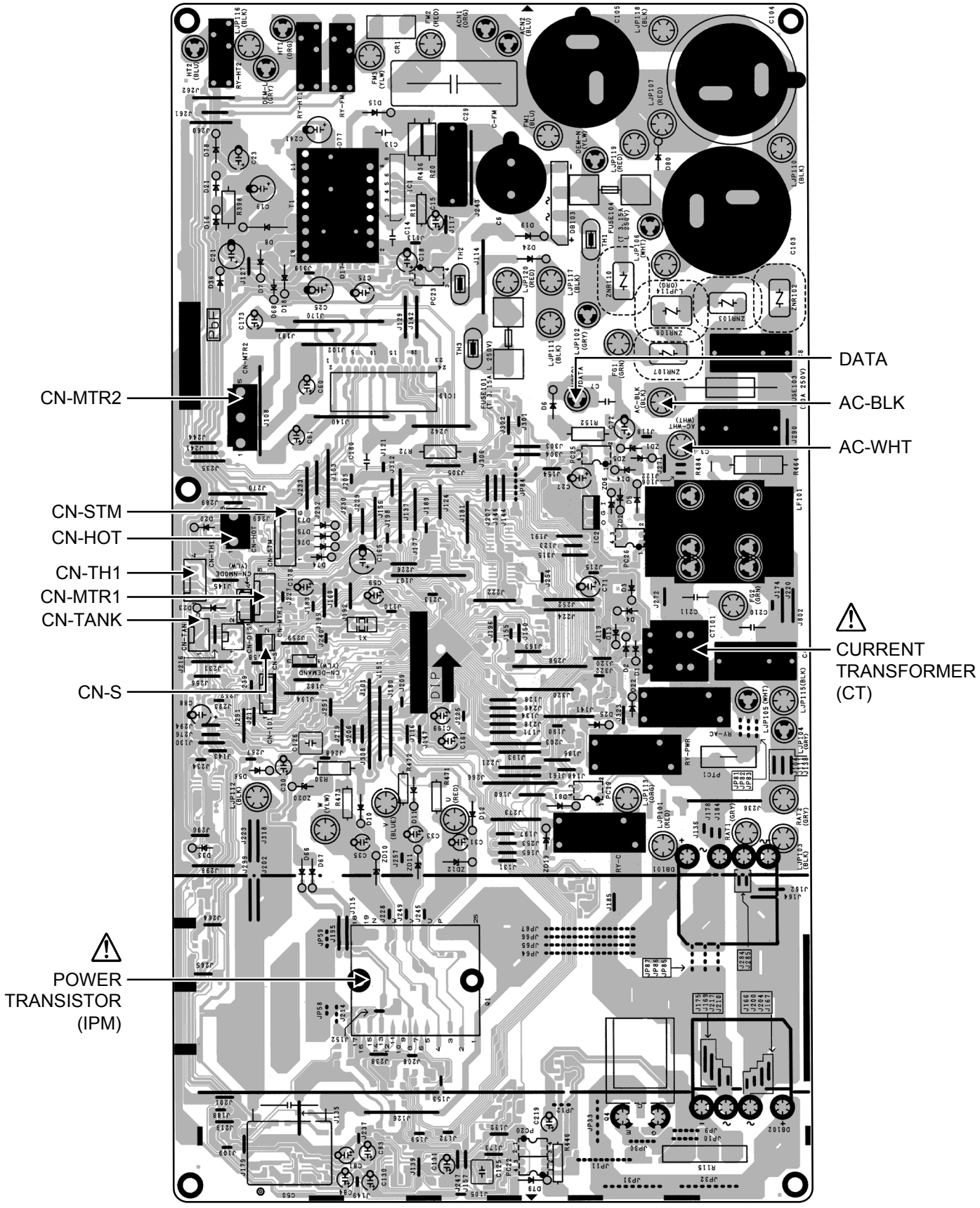


10.1.4 High Voltage Power Supply Printed Circuit Board



10.2 Outdoor Unit

10.2.1 Main Printed Circuit Board



11. Installation Instruction

11.1 Select The Best Location

11.1.1 Indoor Unit

- Do not install the unit in excessive oil fume area such as kitchen, workshop and etc.
- There should not be any heat source or steam near the unit.
- There should not be any obstacles blocking the air circulation.
- A place where air circulation in the room is good.
- A place where drainage can be easily done.
- A place where noise prevention is taken into consideration.
- Do not install the unit near the door way.
- Ensure the spaces indicated by arrows from the wall, ceiling, fence or other obstacles.
- Recommended installation height for indoor unit shall be at least 2.5 m.

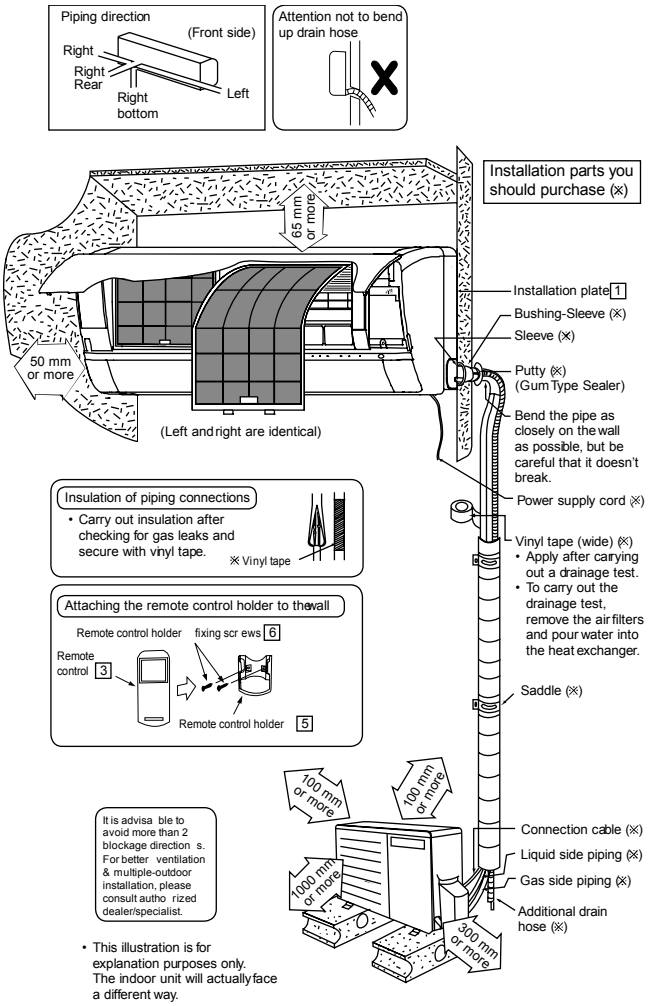
11.1.2 Outdoor Unit

- If an awning is built over the unit to prevent direct sunlight or rain, be careful that heat radiation from the condenser is not obstructed.
- There should not be any animal or plant which could be affected by hot air discharged.
- Keep the spaces indicated by arrows from wall, ceiling, fence or other obstacles.
- Do not place any obstacles which may cause a short circuit of the discharged air.
- If piping length is over the [piping length for additional gas], additional refrigerant should be added as shown in the table.

Model	Horse Power (HP)	Piping size		Std. Length (m)	Max. Elevation (m)	Min. Piping Length (m)	Max. Piping Length (m)	Additional Refrigerant (g/m)	Piping Length for add. gas (m)
		Gas	Liquid						
HE9***, NE9***, XE9***, QE9***,WE9***, AE9***	1.0HP	9.52mm (3/8")	6.35mm (1/4")	5	5	3	15	20	7.5
HE12***, NE12***, XE12***, QE12***, WE12***, AE12***	1.5HP				5	3	15	20	7.5

Example: For HE9***
If the unit is installed at 10 m distance, the quantity of additional refrigerant should be 50 g …. (10-7.5) m × 20 g/m =50 g.

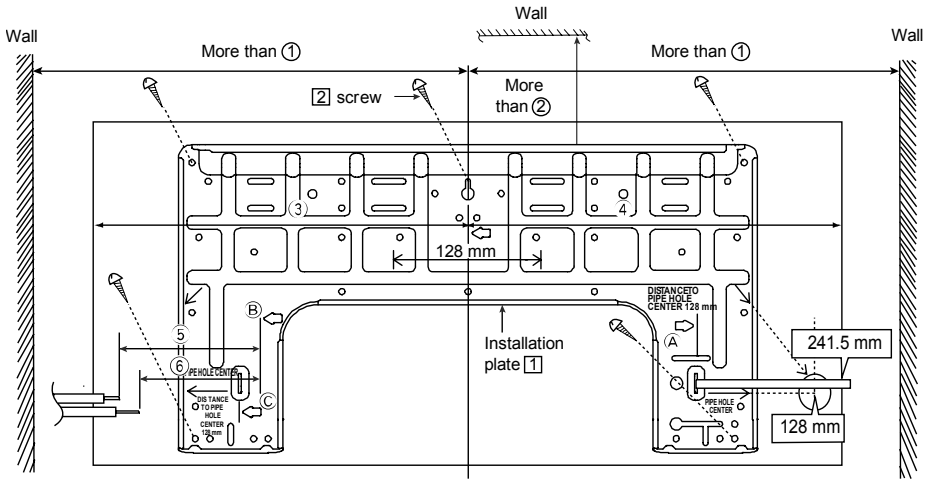
11.1.3 Indoor/Outdoor Unit Installation Diagram


Piping direction
(Front side)
Right
Right Rear
Right bottom
Left
Attention not to bend up drain hose
Installation parts you should purchase (※)
65 mm or more
50 mm or more
(Left and right are identical)
Installation plate 1
Bushing-Sleeve (※)
Sleeve (※)
Putty (※) (Gum Type Sealer)
Bend the pipe as closely on the wall as possible, but be careful that it doesn't break.
Power supply cord (※)
Vinyl tape (wide) (※)
• Apply after carrying out a drainage test.
• To carry out the drainage test, remove the air filters and pour water into the heat exchanger.
Saddle (※)
Insulation of piping connections
• Carry out insulation after checking for gas leaks and secure with vinyl tape.
※ Vinyl tape
Attaching the remote control holder to the wall
Remote control holder
fixing screws 6
Remote control 3
Remote control holder 5
100 mm or more
100 mm or more
1000 mm or more
300 mm or more
Connection cable (※)
Liquid side piping (※)
Gas side piping (※)
Additional drain hose (※)
It is advisable to avoid more than 2 blockage directions. For better ventilation & multiple-outdoor installation, please consult authorized dealer/specialist.
• This illustration is for explanation purposes only. The indoor unit will actually face a different way.

11.2 Indoor Unit

11.2.1 How to Fix Installation Plate

The mounting wall shall be strong and solid enough to prevent it from vibration.



Model	Dimension					
	①	②	③	④	⑤	⑥
HE9/12***, NE9/12***, XE9/12***, QE9/12***,WE9/12***, AE9/12***	485 mm	92 mm	435 mm	435 mm	127 mm	88 mm

The centre of installation plate should be at more than ① at right and left of the wall.

The distance from installation plate edge to ceiling should more than ②.

From installation plate center to unit's left side is ③.

From installation plate center to unit's right side is ④.

Ⓑ : For left side piping, piping connection for liquid should be about ⑤ from this line.

: For left side piping, piping connection for gas should be about ⑥ from this line.

1 Mount the installation plate on the wall with 5 screws or more (at least 5 screws).
(If mounting the unit on the concrete wall, consider using anchor bolts.)
   - Always mount the installation plate horizontally by aligning the marking-off line with the thread and using a level gauge.

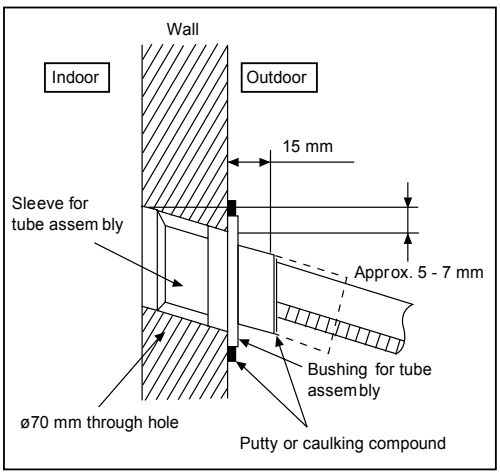
2 Drill the piping plate hole with ø70 mm hole-core drill.
   - Line according to the left and right side of the installation plate. The meeting point of the extended line is the center of the hole. Another method is by putting measuring tape at position as shown in the diagram above. The hole center is obtained by measuring the distance namely 128 mm for left and right hole respectively.
   - Drill the piping hole at either the right or the left and the hole should be slightly slanting to the outdoor side.

11.2.2 To Drill a Hole in the Wall and Install a Sleeve of Piping

1 Insert the piping sleeve to the hole.
2 Fix the bushing to the sleeve.
3 Cut the sleeve until it extrudes about 15 mm from the wall.

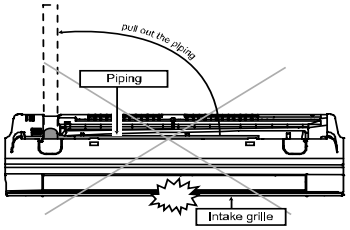
⚠ CAUTION
❗ When the wall is hollow, please be sure to use the sleeve for tube assembly to prevent dangers caused by mice biting the connection cable.

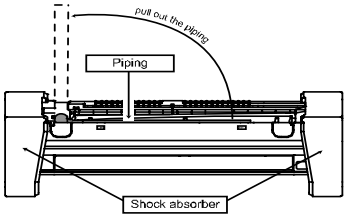
4 Finish by sealing the sleeve with putty or caulking compound at the final stage.



11.2.3 Indoor Unit Installation

- Do not turn over the unit without it's shock absorber during pull out the piping. It may cause intake grille damage.
- Use shock absorber during pull out the piping to protect the intake grille from damage.





11.2.3.1 For the right rear piping

Step-1 Pull out the Indoor piping

Step-2 Install the Indoor Unit

Step-3 Secure the Indoor Unit

Step-4 Insert the connection cable

11.2.3.2 For the right and right bottom piping

Step-1 Pull out the Indoor piping

Step-2 Install the Indoor Unit

Step-3 Insert the connection cable

Step-4 Secure the Indoor Unit

11.2.3.3 For the embedded piping

Step-1 Replace the drain hose

Step-2 Bend the embedded piping

- Use a spring bender or equivalent to bend the piping so that the piping is not crushed.

Step-3 Pull the connection cable into Indoor Unit

- The inside and outside connection cable can be connected without removing the front grille.

Step-4 Cut and flare the embedded piping

- When determining the dimensions of the piping, slide the unit all the way to the left on the installation plate.
- Refer to the section “Cutting and flaring the piping”.

Step-5 Install the Indoor Unit

Step-6 Connect the piping

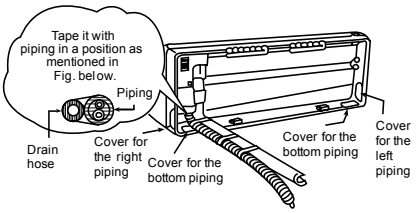
- Please refer to “Connecting the piping” column in outdoor unit section. (Below steps are done after connecting the outdoor piping and gas-leakage confirmation.)

Step-7 Insulate and finish the piping

- Please refer to “Insulation of piping connection” column as mentioned in indoor/outdoor unit installation.

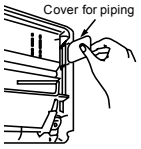
Step-8 Secure the Indoor Unit

Right Rear piping

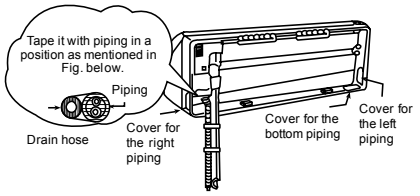

Tape it with piping in a position as mentioned in Fig. below.
Piping
Drain hose
Cover for the right piping
Cover for the bottom piping
Cover for the bottom piping
Cover for the left piping

How to keep the cover

In case of the cover is cut, keep the cover at the rear of chassis as shown in the illust ration for future reinstallation .
(Left, right and 2 bottom covers for piping.)

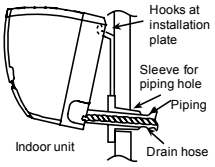


Right and Right Bottom piping


Tape it with piping in a position as mentioned in Fig. below.
Piping
Drain hose
Cover for the right piping
Cover for the bottom piping
Cover for the left piping

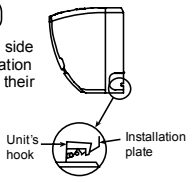
Install the indoor unit

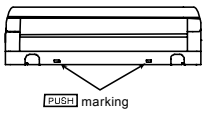
Hook the indoor unit onto the upper portion of installation plate. (Engage the indoor unit with the upper edge of the installation plate). Ensure the hooks are properly seated on the installation plate by moving it in left and right.



Secure the Indoor Unit

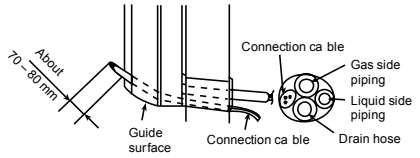
1. Press the lower left and right side of the unit against the installation plate until hooks engages with their slot (sound click).





To take out the unit, push the PUSH marking at the bottom unit, and pull it slightly towards you to disengage the hooks from the unit.

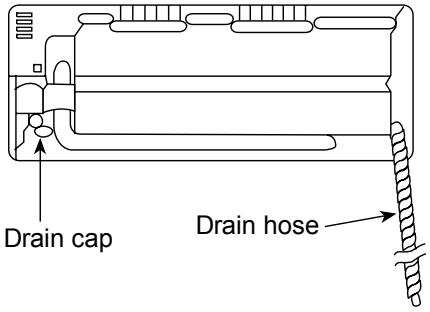
Insert the connection cable

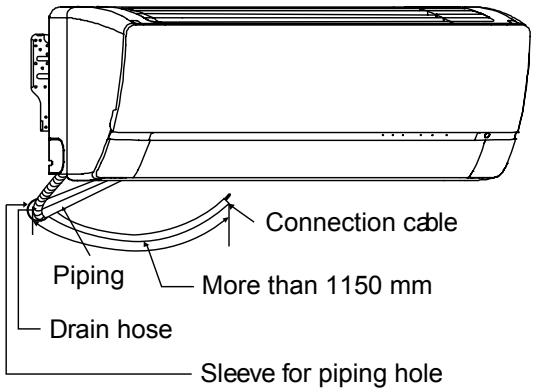


(This can be used for left rear piping and bottom piping also.)

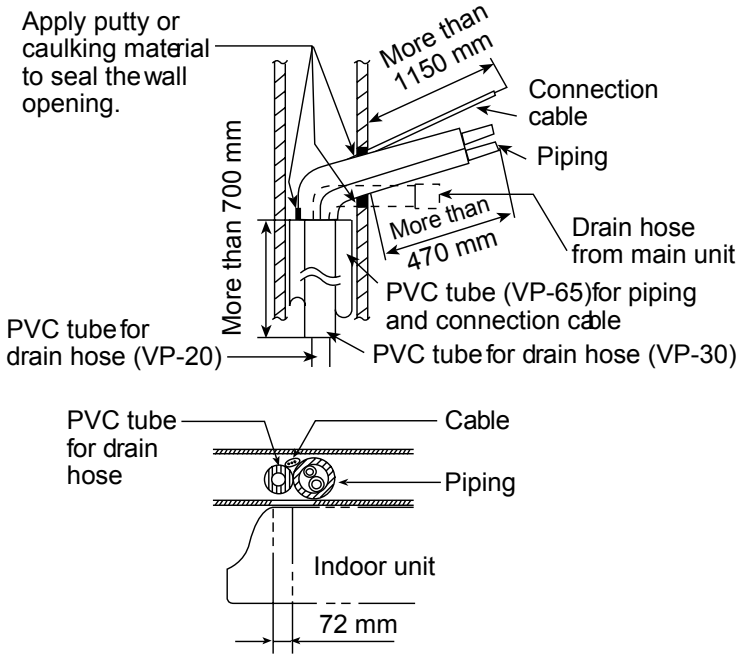
Replace the d rain hose

Rear view for left piping installation

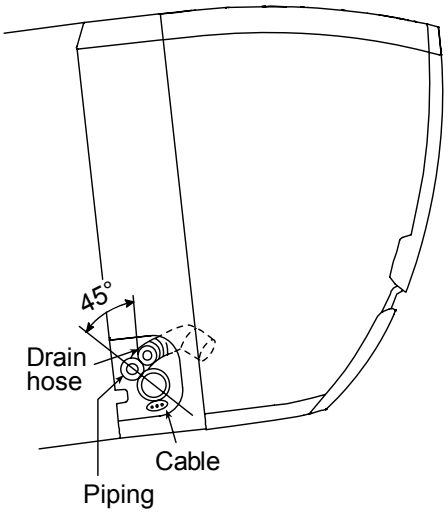




- How to pull the piping and drain hose out, in case of the embedded piping .


Apply putty or caulking material to seal the wall opening.
More than 1150 mm
Connection cable
Piping
More than 700 mm
More than 470 mm
Drain hose from main unit
PVC tube (VP-65)for piping and connection cable
PVC tube for drain hose (VP-20)
PVC tube for drain hose (VP-30)
PVC tube for drain hose
Cable
Piping
Indoor unit
72 mm

- In case of left piping how to insert the connection cable and drain hose.



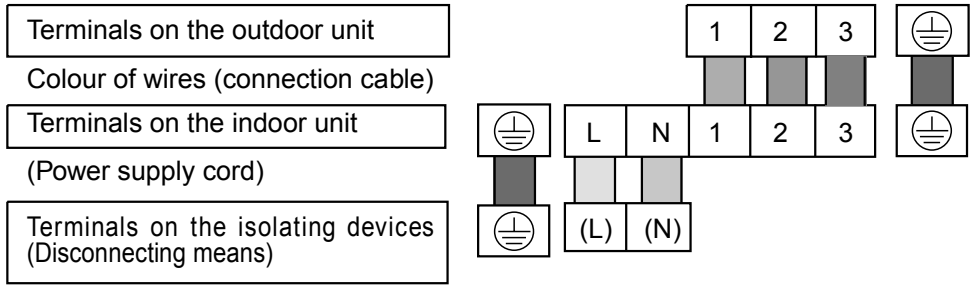
(For the right piping, follow the same procedure)

11.2.4 Connect the Cable to the Indoor Unit

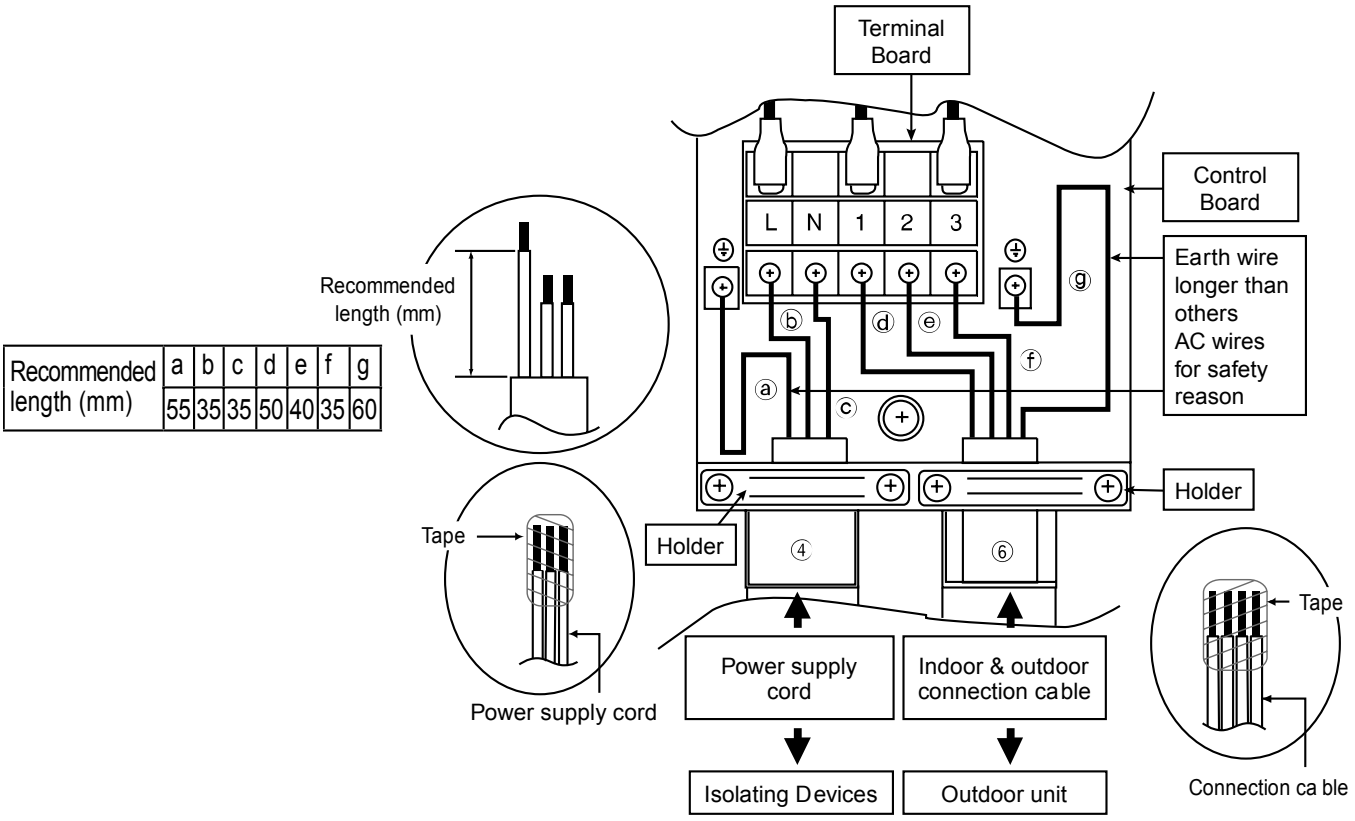
The power supply cord, indoor and outdoor unit connection cable can be connected without removing the front grille.

1 Install the indoor unit on the installing holder that mounted on the wall.
2 Open the front panel and grille door by loosening the screw.
3 Cable connection to the power supply through Isolating Devices (Disconnecting means).
   - Connect the approved polychloroprene sheathed **power supply cord** 3 × 1.5 mm^2 type designation 245 IEC 57 or heavier cord to the terminal board, and connect the other end of the cable to Isolating Devices (Disconnecting means).
   - Do not use joint power supply cord. Replace the wire if the existing wire (from concealed wiring, or otherwise) is too short.
   - In unavoidable case, joining of power supply cord between isolating devices and terminal board of air conditioner shall be done by using approved socket and plug with earth pin rated 15/16A . Wiring work to both socket and plug must follow to national wiring standard.
4 Bind all the power supply cord lead wire with tape and route the power supply cord via the left escapement.
5 **Connection cable** between indoor unit and outdoor unit shall be approved polychloroprene sheathed 4 × 1.5 mm^2 flexible cord, type designation 245 IEC 57 or heavier cord. Do not use joint connection cable. Replace the wire if the existing wire (from concealed wiring, or otherwise) is too short.
6 Bind all the indoor and outdoor connection cable with tape and route the connection cable via the right escapement.

7 Remove the tapes and connect the power supply cord and connection cable between indoor unit and outdoor unit according to the diagram below.


Terminals on the outdoor unit
Colour of wires (connection cable)
Terminals on the indoor unit
(Power supply cord)
Terminals on the isolating devices (Disconnecting means)
1 2 3
L N 1 2 3
(L) (N)

8 Secure the power supply cord and connection cable onto the control board with the holder.
9 Close grille door by tighten with screw and close the front panel.

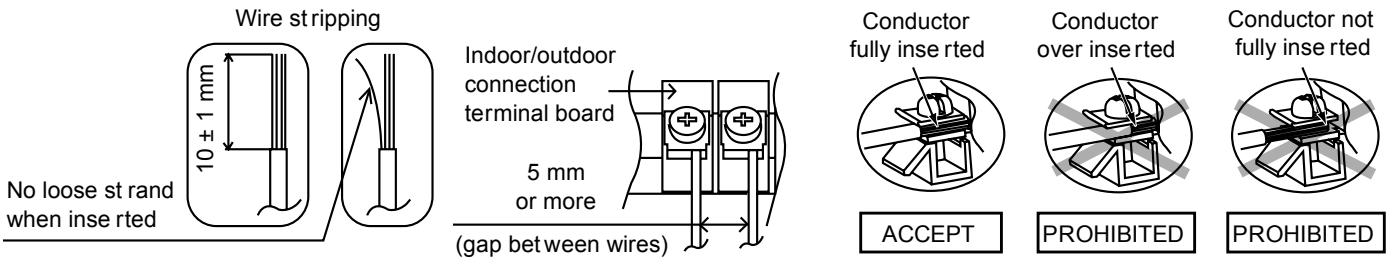


Recommended length (mm)	a	b	c	d	e	f	g
	55	35	35	50	40	35	60

⚠ WARNING
This equipment must be properly earthed.

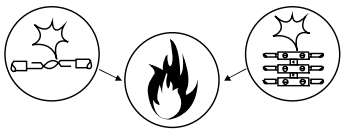
Note:
- Isolating Devices (Disconnecting means) should have minimum 3.0 mm contact gap.
- Ensure the colour of wires of outdoor unit and the terminal Nos. are the same to the indoor's respectively.
- Earth wire shall be Yellow/Green (Y/G) in colour and longer than other AC wires as shown in the figure for the electrical safety in case of the slipping out of the cord from the anchorage.

11.2.4.1 Wire Stripping, Connecting Requirement

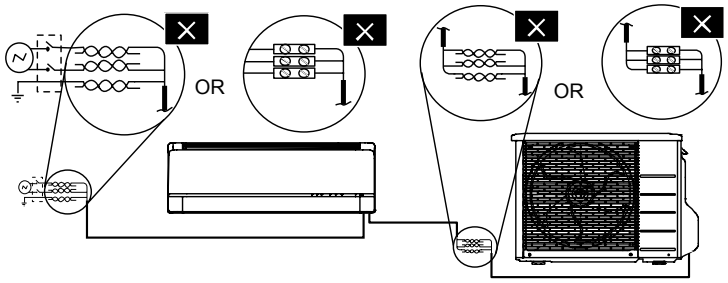


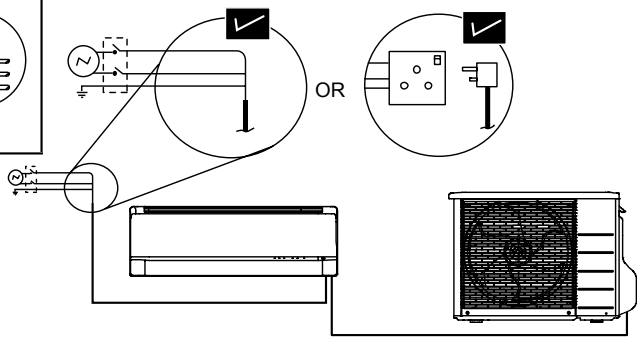
WARNING

RISK OF FIRE
JOINING
OF WIRES
MAY CAUSE
OVERHE ATING
AND FIRE.



Do not joint wires



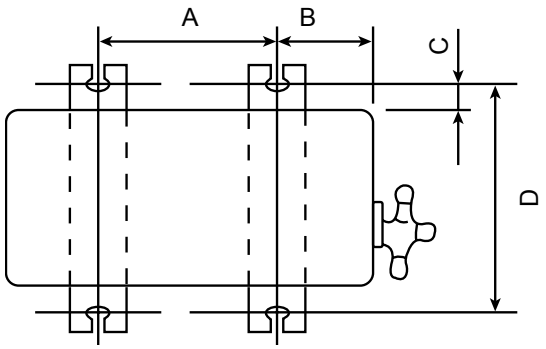


- Use complete wire without joining.
- Use approved socket and plug with ea rth pin.
- Wire connection in this area must follow to national wiring rules.

11.3 Outdoor Unit

11.3.1 Install the Outdoor Unit

- After selecting the best location, start installation to Indoor/Outdoor Unit Installation Diagram.
  1 Fix the unit on concrete or rigid frame firmly and horizontally by bolt nut (ø10 mm).
  2 When installing at roof, please consider strong wind and earthquake.
  Please fasten the installation stand firmly with bolt or nails.



Model	A	B	C	D
HE9***, NE9***, XE9***,QE9***,AE9***	540 mm	160 mm	18.5mm	330 mm
HE12***, NE12***, XE12***, QE12***, AE12***				

11.3.2 Connect the piping

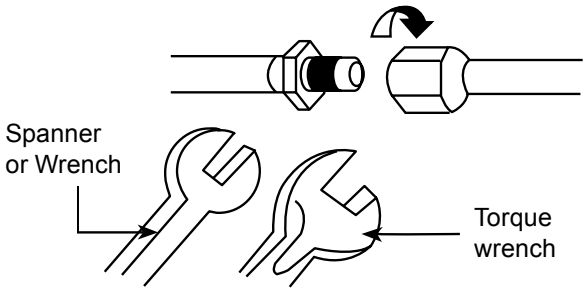
11.3.2.1 Connecting the piping to Indoor

Please make flare after inserting flare nut (locate at joint portion of tube assembly) onto the copper pipe. (In case of using long piping)

Connect the piping

- Align the center of piping and sufficiently tighten the flare nut with fingers.
- Further tighten the flare nut with torque wrench in specified torque as stated in the table.

Do not overtighten, overtightening may cause gas leakage	
Piping size	Torque
6.35 mm (1/4”)	[18 N•m (1.8 kgf.m)]
9.52 mm (3/8”)	[42 N•m (4.3 kgf.m)]
12.7 mm (1/2”)	[55 N•m (5.6 kgf.m)]
15.88 mm (5/8”)	[65 N•m (6.6 kgf.m)]
19.05 mm (3/4”)	[100 N•m (10.2 kgf.m)]

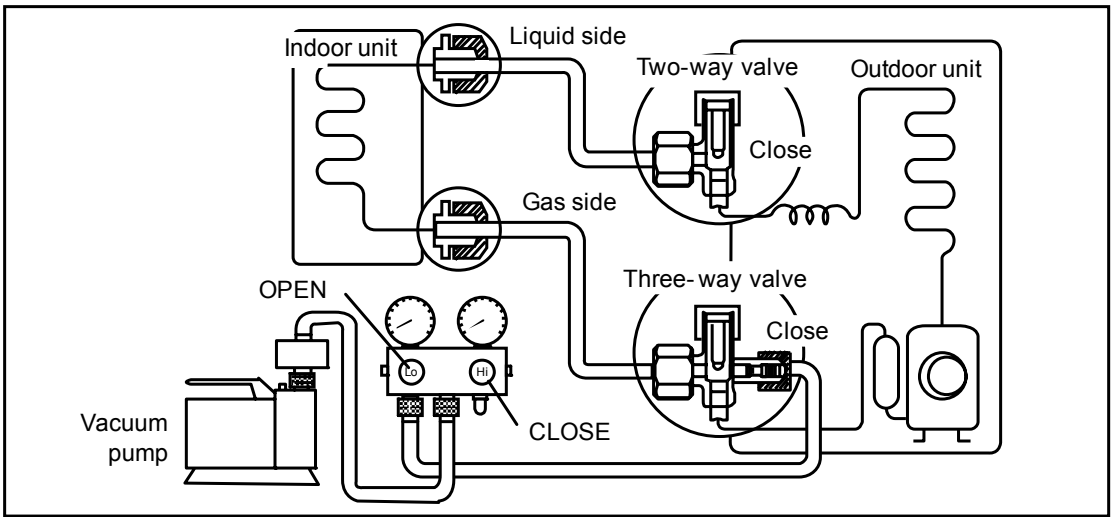


11.3.2.2 Connecting the piping to Outdoor

Decide piping length and then cut by using pipe cutter.
Remove burrs from cut edge.
Make flare after inserting the flare nut (locate at valve) onto the copper pipe.
Align center of piping to valve and then tighten with torque wrench to the specified torque as stated in the table.

11.3.3 Evacuation of the Equipment

WHEN INSTALLING AN AIR CONDITIONER, BE SURE TO EVACUATE THE AIR INSIDE THE INDOOR UNIT AND PIPES in the following procedure.



1 Connect a charging hose with a push pin to the Low side of a charging set and the service port of the 3-way valve.
   - Be sure to connect the end of the charging hose with the push pin to the service port.
2 Connect the center hose of the charging set to a vacuum pump.
3 Turn on the power switch of the vacuum pump and make sure that the needle in the gauge moves from 0 cmHg (0 MPa) to -76 cmHg (-0.1 MPa). Then evacuate the air approximately ten minutes.
4 Close the Low side valve of the charging set and turn off the vacuum pump. Make sure that the needle in the gauge does not move after approximately five minutes.
   Note : BE SURE TO TAKE THIS PROCEDURE IN ORDER TO AVOID REFRIGERANT GAS LEAKAGE.
5 Disconnect the charging hose from the vacuum pump and from the service port of the 3-way valve.
6 Tighten the service port caps of the 3-way valve at a torque of 18 N•m with a torque wrench.
7 Remove the valve caps of both of the 2-way valve and 3-way valve. Position both of the valves to “OPEN” using a hexagonal wrench (4 mm).
8 Mount valve caps onto the 2-way valve and the 3-way valve.
   - Be sure to check for gas leakage.

- If gauge needle does not move from 0 cmHg (0 MPa) to -76 cmHg (-0.1 MPa), in the step ③ above take the following measure:
- If the leak stops when the piping connections are tightened further, continue working from step ③.
- If the leak does not stop when the connections are retightened, repair location of leak.
- Do not release refrigerant during piping work for installation and reinstallation.
- Take care of the liquid refrigerant, it may cause frostbite.

11.3.4 Connect the cable to the Outdoor Unit

1 Remove the control board cover from the unit by loosening the screw.

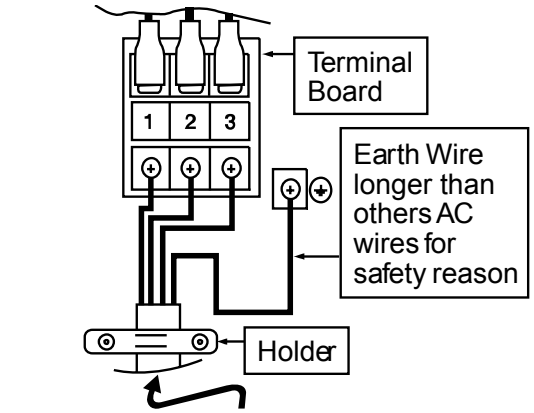
2 **Connection cable** between indoor unit and outdoor unit shall be approved polychloroprene sheathed 4 × 1.5 mm^2 flexible cord, type designation 245 IEC 57 or heavier cord. Do not use joint connection cable. Replace the wire if the existing wire (from concealed wiring, or otherwise) is too short.

Terminals on the outdoor unit	1	2	3	⏚
Colour of wires				
Terminals on the indoor unit	1	2	3	⏚

3 Secure the cable onto the control board with the holder (clamper).

4 Attach the control board cover back to the original position with screw.

5 For wire stripping and connection requirement, refer to instruction 11.2.4.1 of indoor unit.



⚠ WARNING

⏚ This equipment must be properly earthed.

- Earth wire shall be Yellow/Green (Y/G) in colour and longer than other AC wires for safety reason.

11.3.5 Piping Insulation

1 Please carry out insulation at pipe connection portion as mentioned in Indoor/Outdoor Unit Installation Diagram. Please wrap the insulated piping end to prevent water from going inside the piping.

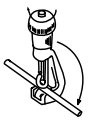
2 If drain hose or connecting piping is in the room (where dew may form), please increase the insulation by using POLY-E FOAM with thickness 6 mm or above.

11.3.5.1 Cutting and flaring the piping

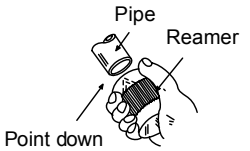
1 Please cut using pipe cutter and then remove the burrs.

2 Remove the burrs by using reamer. If burrs is not removed, gas leakage may be caused. Turn the piping end down to avoid the metal powder entering the pipe.

3 Please make flare after inserting the flare nut onto the copper pipes.

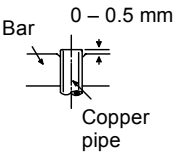


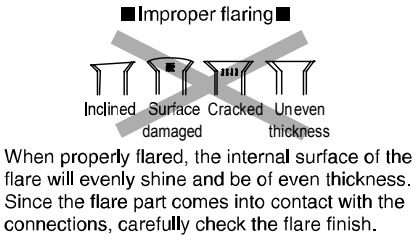
1. To cut



2. To remove burrs

3. To flare

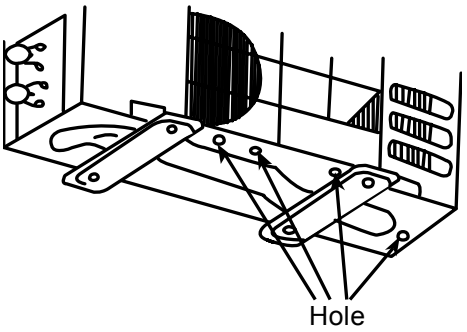




When properly flared, the internal surface of the flare will evenly shine and be of even thickness. Since the flare part comes into contact with the connections, carefully check the flare finish.

11.3.5.2 Outdoor Unit Drain Water

- Water will drip from the base pan hole area during defrost function.
- To avoid water dripping, do not stand or place objects at this area.



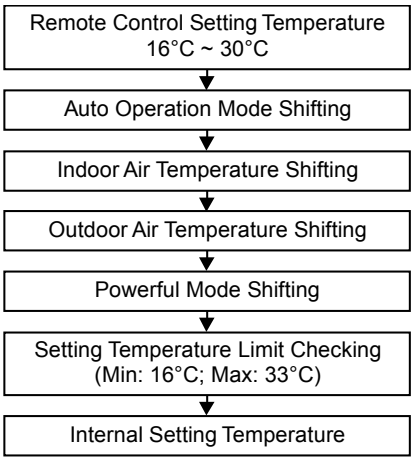
12. Operation and Control

12.1 Basic Function

Inverter control, which equipped with a microcomputer in determining the most suitable operating mode as time passes, automatically adjusts output power for maximum comfort always. In order to achieve the suitable operating mode, the microcomputer maintains the set temperature by measuring the temperature of the environment and performing temperature shifting. The compressor at outdoor unit is operating following the frequency instructed by the microcomputer at indoor unit that judging the condition according to internal setting temperature and intake air temperature.

12.1.1 Internal Setting Temperature

Once the operation starts, remote control setting temperature will be taken as base value for temperature shifting processes.
These shifting processes are depending on the air conditioner settings and the operation environment. The final shifted value will be used as internal setting temperature and it is updated continuously whenever the electrical power is supplied to the unit.



12.1.2 Cooling Operation

12.1.2.1 Thermostat control

- Compressor is OFF when Intake Air Temperature - Internal Setting Temperature < -1.5°C continue for 3 minutes.
- Compressor is ON after waiting for 3 minutes, if the Intake Air Temperature - Internal Setting Temperature > Compressor OFF point.

12.1.3 Soft Dry Operation

12.1.3.1 Thermostat control

- Compressor is OFF when Intake Air Temperature - Internal Setting Temperature < -2.0°C continue for 3 minutes.
- Compressor is ON after waiting for 3 minutes, if the Intake Air Temperature - Internal Setting Temperature > Compressor OFF point.

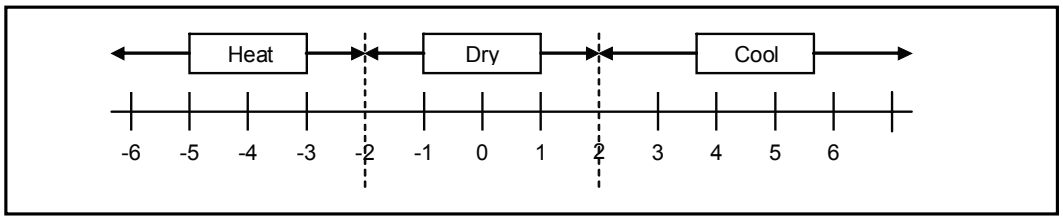
12.1.4 Heating Operation

12.1.4.1 Thermostat control

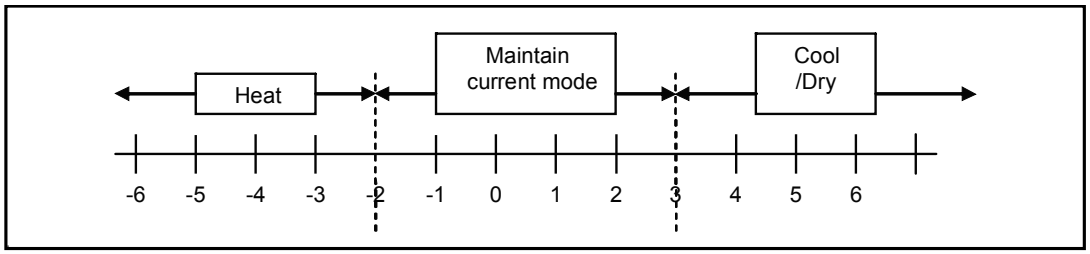
- Compressor is OFF when Intake Air Temperature - Internal Setting Temperature > +2.0°C continue for 3 minutes.
- Compressor is ON after waiting for 3 minutes, if the Intake Air Temperature - Internal Setting Temperature < Compressor OFF point.

12.1.5 Automatic Operation

- This mode can be set using remote control and the operation is decided by remote control setting temperature, remote control operation mode and indoor intake air temperature.
- During operation mode judgment, indoor fan motor (with speed of Lo-) is running for 30 seconds to detect the indoor intake air temperature.
- Every 10 minutes, the indoor temperature is judged.
- For the 1st judgment
  - If indoor intake temperature - remote control setting temperature ≥ 2°C, COOL mode is decided.
  - If -2°C ≤ indoor intake temperature - remote control setting temperature < 2°C, DRY mode is decided.
  - If indoor intake temperature - remote control setting temperature < -2°C, HEAT mode is decided.



- For the 2nd judgment onwards
  - If indoor intake temperature - remote control setting temperature ≥ 3°C, if previous operate in DRY mode, then continue in DRY mode. otherwise COOL mode is decided.
  - If -2°C ≤ indoor intake temperature - remote control setting temperature < 3°C, maintain with previous mode.
  - If indoor intake temperature - remote control setting temperature < -2°C, HEAT mode is decided.



12.1.6 Fan Operation

- Fan Operation is used to circulate air in a room.
- During operation, indoor fan run continuously but outdoor fan and compressor stop.
- Temperature setting is not applicable.

12.2 Indoor Fan Motor Operation

A. Basic Rotation Speed (rpm)

i. Manual Fan Speed

[Cooling, Dry, Fan]

- Fan motor's number of rotation is determined according to remote control setting.

Remote control	○	○	○	○	○
Tab	Hi	Me+	Me	Me-	Lo

[Heating]

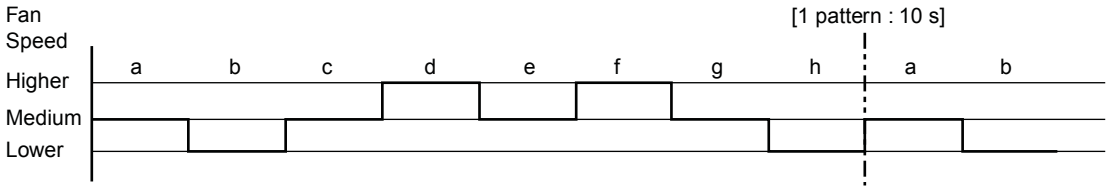
- Fan motor's number of rotation is determined according to remote control setting.

Remote control	○	○	○	○	○
Tab	SHi	Me+	Me	Me-	Lo

ii. Auto Fan Speed

[Cooling, Dry]

- According to room temperature and setting temperature, indoor fan speed is determined automatically.
- The indoor fan will operate according to pattern below.

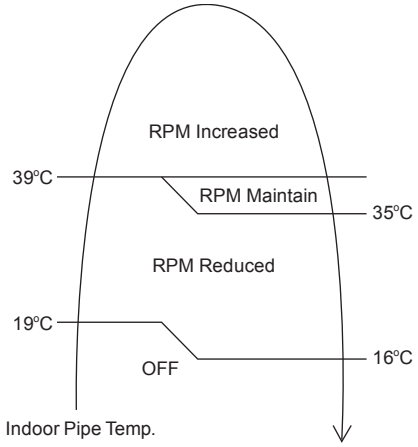


[Fan]

- Indoor fan speed is fixed at predetermined speed.

[Heating]

- According to indoor pipe temperature, automatic heating fan speed is determined as follows.

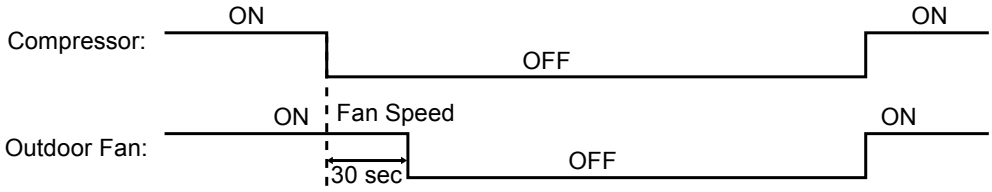


B. Feedback control

- Immediately after the fan motor started, feedback control is performed once every second.
- During fan motor on, if fan motor feedback ≥ 2550 rpm or < 50 rpm continue for 10 seconds, then fan motor error counter increase, fan motor is then stop and restart. If the fan motor counter becomes 7 times, then H19 - fan motor error is detected.
  Operation stops and cannot on back.

12.3 Outdoor Fan Motor Operation

Outdoor fan motor is operated with 15 fan speed number of rotations. It starts when compressor starts operation and it stops 30 seconds after compressor stops operation.



12.4 Airflow Direction

1. There are two types of airflow, vertical airflow (directed by horizontal vane) and horizontal airflow (directed by vertical vanes).
2. Control of airflow direction can be automatic (angles of direction is determined by operation mode, heat exchanger temperature and intake air temperature) and manual (angles of direction can be adjusted using remote control).

12.4.1 Vertical Airflow

Operation Mode	Airflow Direction		Upper Vane Angle (°)					Lower Vane Angle (°)				
			1	2	3	4	5	1	2	3	4	5
Heating	Auto with Heat Exchanger Temperature	A	25					17				
		B	55					37				
		C	25					17				
	Summer House		55					37				
	Manual		20	45	55	65	70	17	27	37	47	56
Cooling and Fan	Auto		45 ~ 70					2 ~ 39				
	Manual		20	25	50	55	70	2	7	17	27	39
Soft Dry	Auto		45 ~ 70					2 ~ 39				
	Manual		20	25	50	55	70	2	7	17	27	39

1. Automatic vertical airflow direction can be set using remote control; the vane swings up and down within the angles as stated above. For heating mode operation, the angle of the vane depands on the indoor heat exchanger temperature as Figure 1 below. It does not swing during fan motor stop. When the air conditioner is stopped using remote control, the vane will shift to close position.
2. Manual vertical airflow direction can be set using remote control; the angles of the vane are as stated above and the positions of the vane are as Figure 2 below. When the air conditioner is stopped using remote control, the vane will shift to close position.

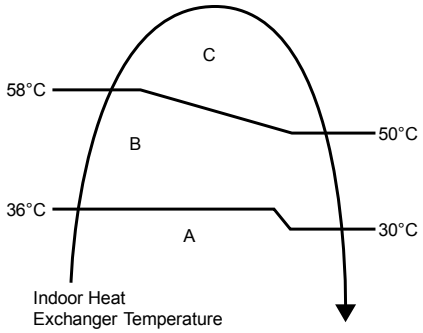


Figure 1

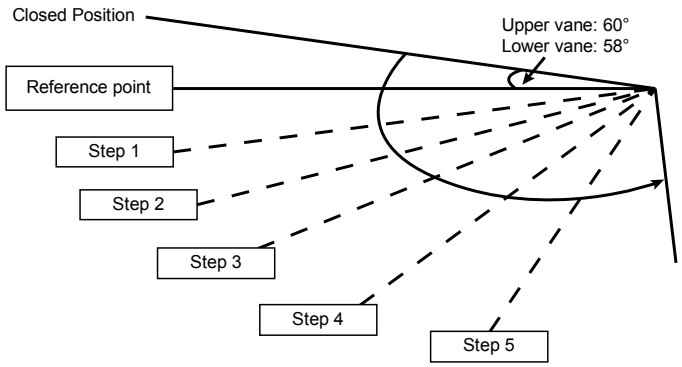


Figure 2

12.4.2 Horizontal Airflow

1. Automatic horizontal airflow direction can be set using remote control; the vane swings left and right within the angles as stated below. For heating mode operation, the angle of the vane depends on the indoor heat exchanger temperature as Figure 1 below. It does not swing during fan motor stop.

Operation Mode		Vane Angle (°)
Heating, with heat exchanger temperature	A	65 ~ 115
	B	90
Cooling, Fan and Soft Dry		65 ~ 115

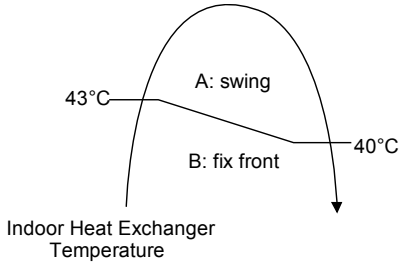


Figure 1

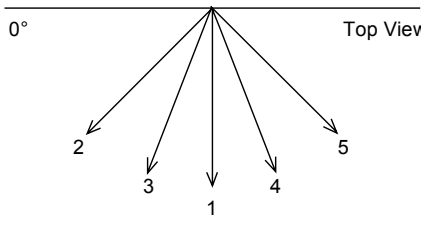
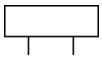
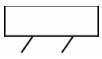
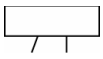
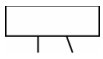
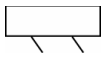


Figure 2

2. Manual horizontal airflow direction can be set using remote control; the angles of the vane are as stated below and the positions of the vane are as Figure 2 above.

Pattern	1	2	3	4	5
Airflow Direction Patterns at Remote Control					
Vane Angle (°)	90	65	77.5	102.5	115

12.5 Quiet operation (Cooling Mode/Cooling area of Dry Mode)

A. Purpose

To provide quiet cooling operation compare to normal operation.

B. Control condition

a. Quiet operation start condition

- When “Quiet” button at remote control is pressed.
  Quiet LED illuminates.

b. Quiet operation stop condition

1. When one of the following conditions is satisfied, quiet operation stops:
   a. Powerful button is pressed.
   b. Stop by OFF/ON switch.
   c. Timer “off” activates.
   d. Quiet button is pressed again.
2. When quiet operation is stopped, operation is shifted to normal operation with previous setting.
3. When fan speed is changed, quiet operation is shifted to quiet operation of the new fan speed.
4. When operation mode is changed, quiet operation is shifted to quiet operation of the new mode.
5. During quiet operation, if timer “on” activates, quiet operation maintains.
6. After off, when on back, quiet operation is not memorised.

C. Control contents

1. Fan speed is changed from normal setting to quiet setting of respective fan speed.
   This is to reduce sound of Hi, Me, Lo for 3dB. (some models more than 3dB).
2. Fan speed for quiet operation is reduced from setting fan speed.

12.6 Quiet operation (Heating)

A. Purpose

To provide quiet heating operation compare to normal operation.

B. Control condition

a. Quiet operation start condition

- When “Quiet” button at remote control is pressed.
  Quiet LED illuminates.

b. Quiet operation stop condition

1. When one of the following conditions is satisfied, quiet operation stops:
   a. Powerful button is pressed.
   b. Stop by OFF/ON switch.
   c. Timer “off” activates.
   d. Quiet button is pressed again.
2. When quiet operation is stopped, operation is shifted to normal operation with previous setting.
3. When fan speed is changed, quiet operation is shifted to quiet operation of the new fan speed.
4. When operation mode is changed, quiet operation is shifted to quiet operation of the new mode, expect fan fan only mode.
5. During quiet operation, if timer “on” activates, quiet operation maintains.
6. After off, when on back, quiet operation is not memorised.

C. Control contents

a. Fan Speed manual

1. Fan speed is changed from normal setting to quiet setting of respective fan speed. This is to reduce sound of Hi, Me, Lo for 3dB.
2. Fan speed for quiet operation is reduced from setting fan speed.

b. Fan Speed Auto

1. Indoor FM RPM depends on pipe temp sensor of indoor heat exchanger.

12.7 Powerful Mode Operation

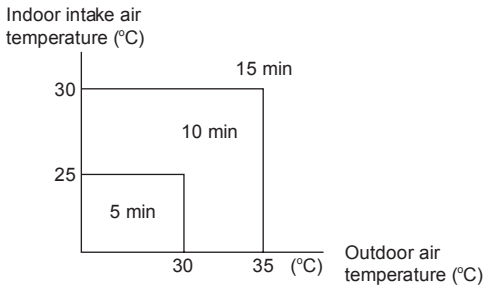
- When the powerful mode is selected, the internal setting temperature will shift lower up to 2°C (for Cooling/Soft Dry) or higher up to 3.5°C (for Heating) than remote control setting temperature for 20 minutes to achieve the setting temperature quickly.

12.8 Timer Control

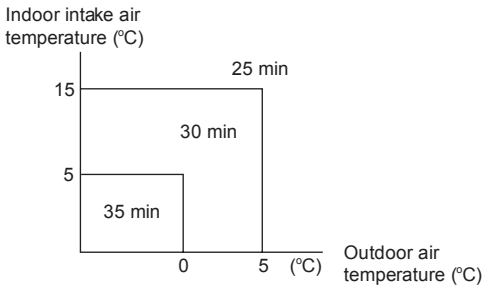
- There are 2 sets of ON and OFF timer available to turn the unit ON or OFF at different preset time.
- If more than one timer had been set, the upcoming timer will be displayed and will activate in sequence.

12.8.1 ON Timer Control

- ON timer 1 and ON timer 2 can be set using remote control, the unit with timer set will start operate earlier than the setting time.
  This is to provide a comfortable environment when reaching the set ON time.
- 60 minutes before the set time, indoor (at fan speed of Lo-) and outdoor fan motor start operate for 30 seconds to determine the indoor intake air temperature and outdoor air temperature in order to judge the operation starting time.
- From the above judgment, the decided operation will start operate earlier than the set time as shown below.



Cooling/Soft Dry/Fan



Heating

12.8.2 OFF Timer Control

OFF timer 1 and OFF timer 2 can be set using remote control, the unit with timer set will stop operate at set time.

12.9 Auto Restart Control

1. When the power supply is cut off during the operation of air conditioner, the compressor will re-operate within three to four minutes (there are 10 patterns between 2 minutes 58 seconds and 3 minutes 52 seconds to be selected randomly) after power supply resumes.
2. This type of control is not applicable during ON/OFF Timer setting.
3. This control can be omitted by open the circuit of JP1 at indoor unit printed circuit board.

12.10 Indication Panel

LED	POWER/DIECE		TIMER	QUIET	POWERFUL	NANOE-G	+8/10°C HEAT	ECONAVI
Color	Green	Blue	Orange	Orange	Orange	Blue	Green	Green
Light ON	Operation ON	Deice Operation	Timer Setting ON	Quiet Mode ON	Powerful Mode ON	nanoe-G ON	+8/10°C HEAT ON	Econavi ON
Light OFF	Operation OFF		Timer Setting OFF	Quiet Mode OFF	Powerful Mode OFF	nanoe-G OFF	+8/10°C HEAT OFF	Econavi OFF

Note:

- If POWER LED is blinking, the possible operation of the unit are Hot Start, operation mode judgment, or ON timer sampling.
- If Timer LED is blinking, there is an abnormality operation occurs.

12.11 nanoe-G Operation

- This operation provides clean air by producing great amount of negative ions and distribute through the discharge airflow to capture or deactivate moulds, bacteria or viruses.

- nanoe-G operation start condition
  - During unit running at any operation mode, if nanoe-G operation is activated, combination operation (operation mode + nanoe-G operation) starts.
  - During unit is OFF, if nanoe-G operation is activated, nanoe-G individual operation starts.

- nanoe-G operation stop condition
  - When OFF/ON button is pressed to stop the operation.
  - When nanoe-G button is pressed.
  - When OFF Timer activates.

- nanoe-G operation pause condition
  - When indoor fan stop (during deice, odor cut control, thermostat off, etc.). nanoe-G operation resume after indoor fan restarts.
  - When indoor intake temperature ≥ 40°C. nanoe-G operation resume after indoor intake temperature ≤ 40°C continuously for 30 minutes.

- Indoor fan control
  - During any operation mode combines with nanoe-G operation, fan speed follows respective operation mode. However, nanoe-G system enabled when fan speed ≥ 500rpm to ensure proper negative ion distribution, nanoe-G system disabled when fan speed < 500 rpm.
  - During nanoe-G individual operation, only Auto Fan Speed and no Powerful operation is allowed. Even if Fan Speed button is pressed, no signal is sent to the unit and no change on remote control display. Auto Fan Speed for nanoe-G operation changes from SHi to Hi after 4 hours of operation.

- Airflow direction control
  - During any operation mode combines with nanoe-G operation, airflow direction follows respective operation mode.
  - During nanoe-G individual operation, only Auto Air Swing is allowed. Even if Air Swing button is pressed, no signal is sent to the unit and no change on remote control display.

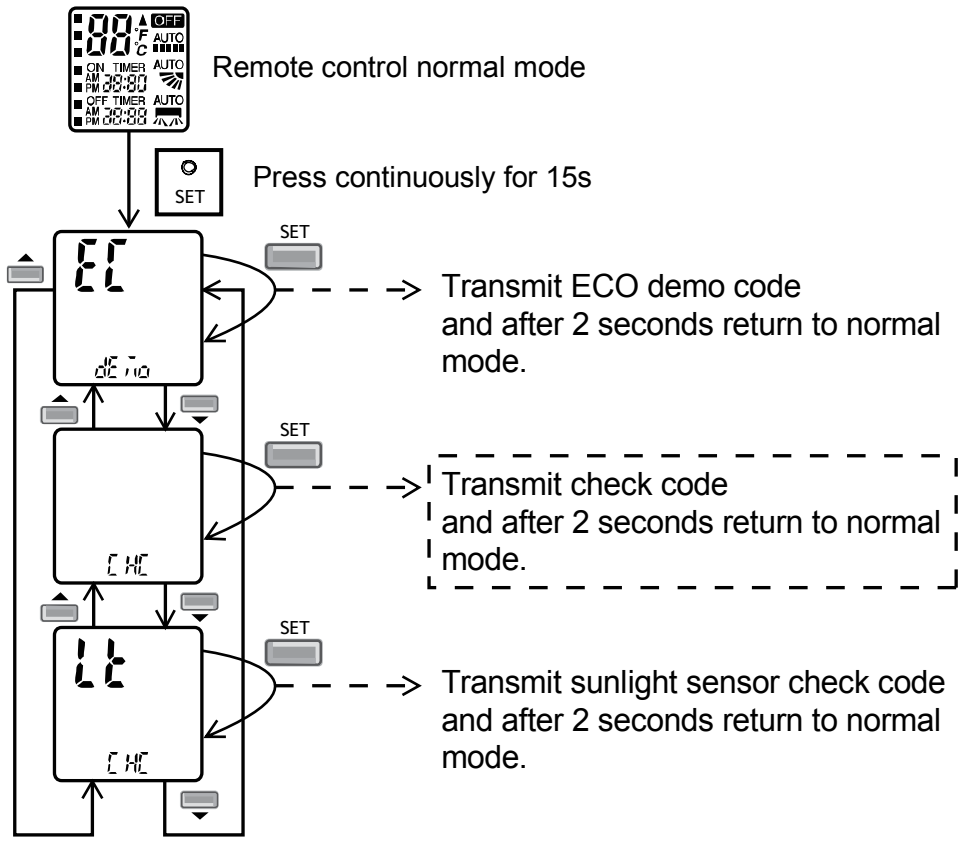
- Timer control
  - When ON Timer activates when unit stops, previous operation resumes and restored last saved nanoe-G operation status.
  - When ON Timer activates during any operation, no change on current operation.
  - When OFF Timer activates during any operation, all operation stops and the latest nanoe-G operation status is saved.

- Indicator
  - When nanoe-G starts, nanoe-G indicator ON.

- Remote control receiving sound
  - Normal operation ➔ nanoe-G operation : Beep
  - Nanoe-G operation ➔ Normal operation : Beep
  - Stop ➔ nanoe-G individual operation : Beep
  - Nanoe-G individual operation ➔ Stop : Long Beep

- Power failure
  - During nanoe-G individual operation, if power failure occurs, after power resumes, nanoe-G individual operation resumes immediately.
  - During combination operation, if power failure occurs, after power resumes, combination operation resume immediately.

- nanoe-G check mode
  - To enable nanoe-G check mode, during nanoe-G operation ON:



  - If there is abnormal discharge, nanoe-G indicator blinks immediately.

- Error detection control
  When nanoe-G indicator blinks, it indicates error listed below:
  - Nanoe-G connector at main PCB open
    - Judgment method
      - During nanoe-G operation, nanoe-G connector at main PCB is opened.
    - Troubleshooting method
      - Connect the connector or stop operation to cancel the blinking.
  - Abnormal discharge error
    - Judgment method
      - During nanoe-G operation, the nanoe-G system has abnormal discharge due to short-circuit caused by water or dust adhesion and so forth, with Lo-feedback voltage (at microcontroller).
      - When abnormal discharge occurred, every 30 minutes the unit supplies power to the nanoe-G system.
      - When abnormal discharge occurs for 24 times continuously, nanoe-G indicator blinks.
    - Troubleshooting method
      - Press nanoe-G button or OFF/ON button to stop the operation and check the nanoe-G connector at PCB.
      - After that, press nanoe-G button again to confirm the nanoe-G indicator do not blinks.
      - The 24 timer counter will be clear after 10 minutes of normal operation or when operation stops.
    - Error reset method
      - Press “OFF/ON” button to OFF the operation.
      - Press AUTO OFF/ON button at indoor unit to OFF the operation.
      - OFF Timer activates.
      - Power supply reset.

- nanoe-G breakdown error
  - Judgment method
    - Hi-feedback voltage (at microcontroller) supplied to the nanoe-G system when nanoe-G operation is OFF; nanoe-G breakdown error show immediately.
    - It is due to indoor PCB or nanoe-G high voltage power supply damage.
    - Operations except nanoe-G continue. Both Timer indicator and nanoe-G indicator blink.

  - Troubleshooting method
    - Press nanoe-G button or OFF/ON button to stop the operation.
    - Change nanoe-G high voltage power supply or main PCB.
    - When Lo-feedback voltage supplied to nanoe-G system during nanoe-G operation ON, nanoe-G indicator and Timer indicator stop blinking.

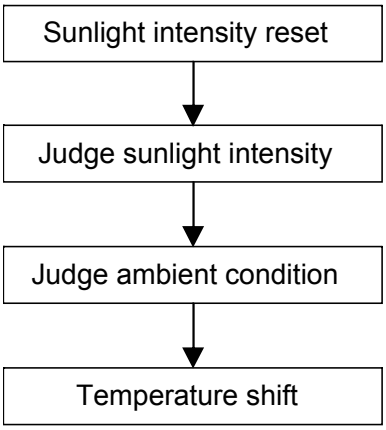
12.12 ECONAVI Operation

- ECONAVI start condition:
  - When ECONAVI button is pressed.

- ECONAVI stop conditions:
  - When ECONAVI button is pressed again.
  - When unit is OFF by OFF/ON button.
  - When unit is OFF when OFF TIMER activates.
  - When unit is OFF by AUTO OFF/ON button at indoor unit.
  - When POWERFUL, QUIET, +8/10°C Heat operation activates.

12.12.1 Sunlight Sensor

- During ECONAVI operation, the sunlight sensor detects sunlight intensity coming through windows and differentiates between sunny and cloudy or night to further optimize energy saving by adjusting the temperature.
- Sunlight judgment is as following

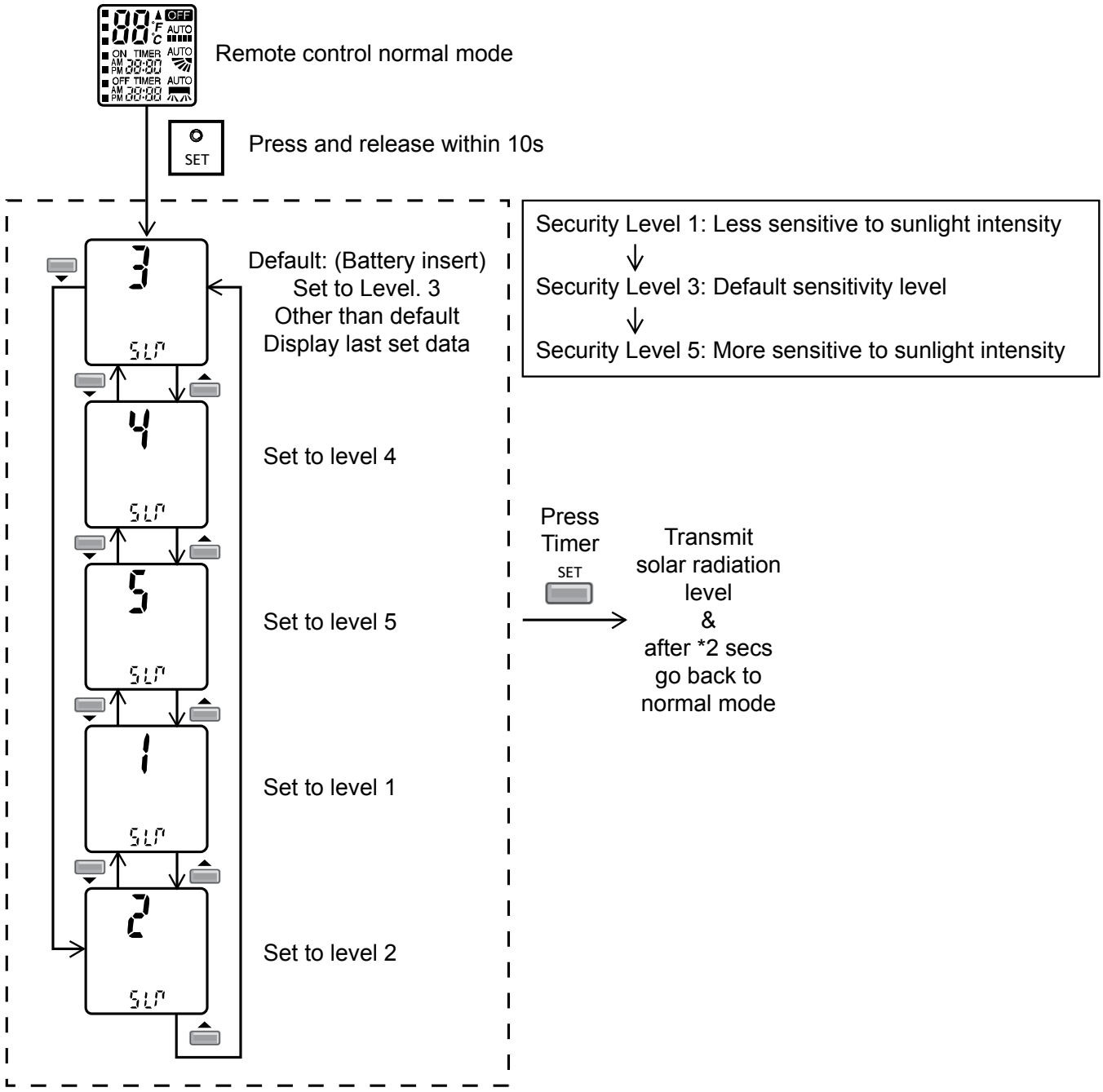


12.12.1.1 Sunlight Intensity Reset

- The sunlight intensity will to reset to zero (no sunlight condition) when
  - Each time ECONAVI is activated.
  - Setting temperature is changed.
  - Operation mode is changed.

12.12.1.2 Judge Sunlight Intensity

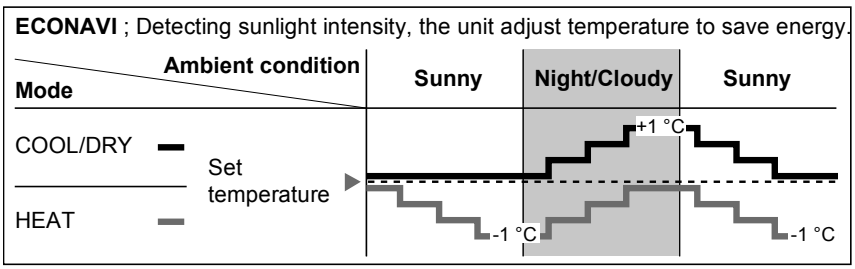
- Based on sunlight sensor output voltage, the sunlight intensity value will be computed and logged to sunlight intensity database.
- The sunlight sensor sensitivity could be adjusted:



12.12.1.3 Judge Ambient Condition

- According to sunlight intensity over a period of time, the system will analyze the ambient condition is sunny, cloudy or night.

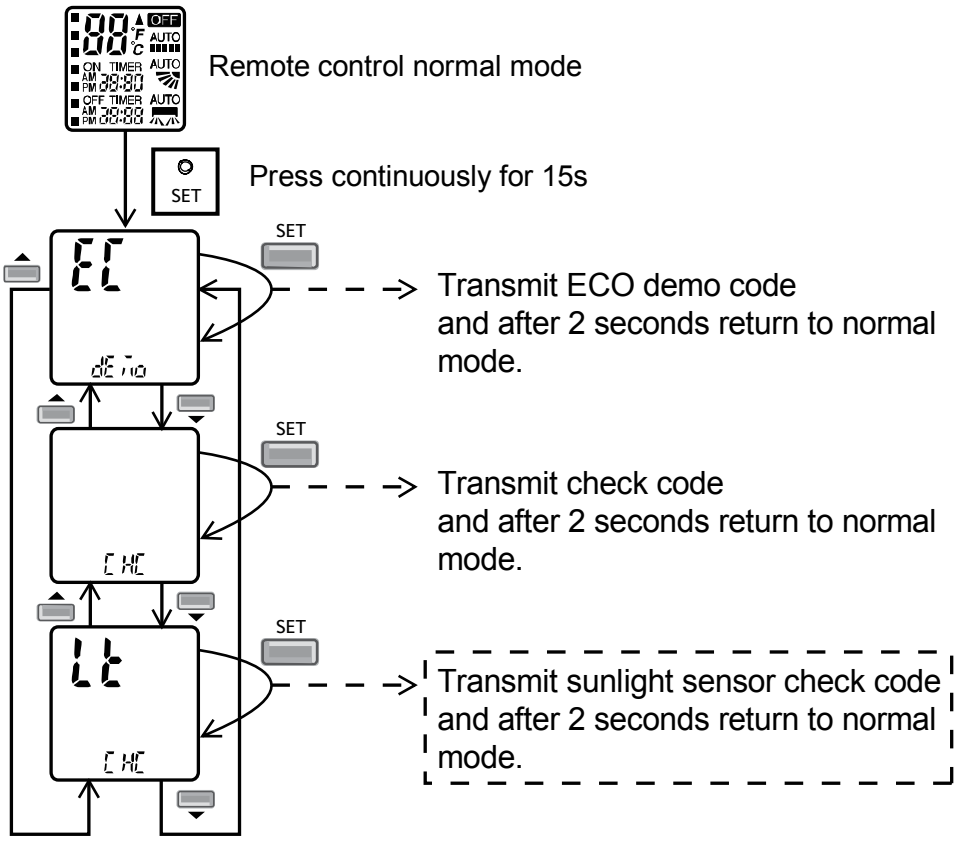
12.12.1.4 Temperature Shift



- In a room without window or with thick curtain, the sunlight sensor will judge as cloudy/night.

12.12.1.5 Sunlight Sensor Check Mode

- To enable sunlight sensor check mode, during unit is OFF (power standby):


Remote control normal mode
SET
Press continuously for 15s
SET
Transmit ECO demo code
and after 2 seconds return to normal mode.
SET
Transmit check code
and after 2 seconds return to normal mode.
SET
Transmit sunlight sensor check code
and after 2 seconds return to normal mode.

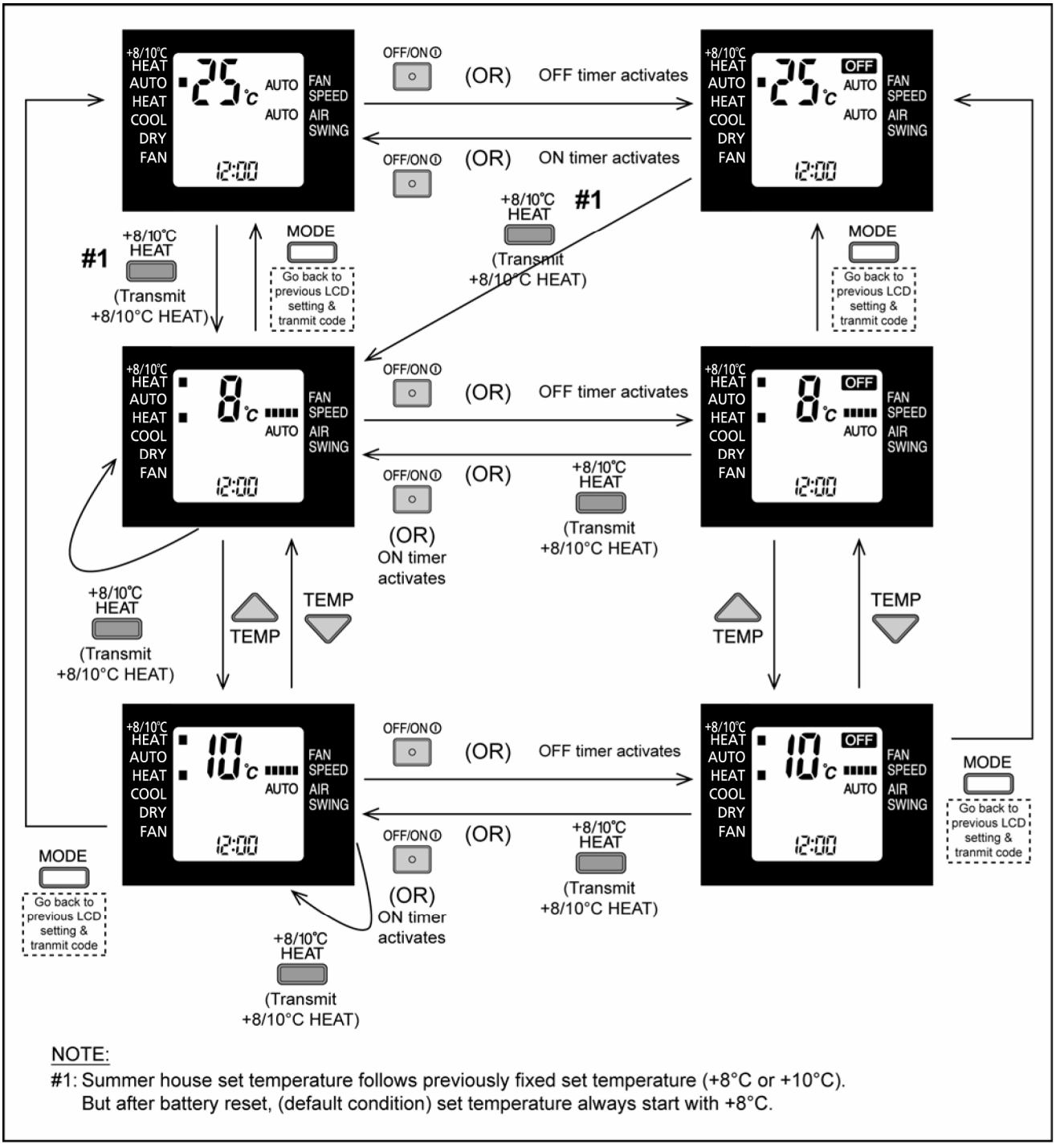
- Operation details
  - The sunlight sensor check mode will be operated for 5 minutes.
  - During check mode, the ON and OFF timer will be memorized but it operation be ignored.
  - During check mode, if the sunlight sensor check code is retransmitted, the 5 minutes counter will be reset.
  - During check mode, if sunlight sensor detected the sunlight intensity value above minimum level, the ECONAVI indicator turns ON. Else if sunlight sensor detected sunlight intensity value below minimum level, the ECONAVI indicator is OFF.
- To disable sunlight sensor check mode
  - After check mode is ended (5 minutes counter elapsed), press AUTO OFF/ON button at indoor unit.
  - If the sunlight sensor detected sunlight intensity is at abnormal range, the check mode will be ended. Please check for error code.

12.12.1.6 Sunlight Sensor Abnormality

- Abnormality detection:
  - When ECONAVI is ON, if the sunlight intensity value below minimum level continuously for 24 hours, the sunlight sensor disconnection error counter will increase by 1 time. If the ECONAVI is OFF, the 24 hours timer will be reset, but the sunlight sensor disconnection error counter will not be reset.
- Error Code judgment
  - When sunlight sensor disconnection error counter reached 15 times, H70 occurred.
  - No TIMER indicator or ECONAVI indicator blinks.
- When error code happened, the unit is able to operate without sunlight sensor.

12.13 +8/10°C Heat Operation

- +8/10°C Heat operation provides heating at low setting temperature in unoccupied houses during winter for the purpose of protecting equipments or housing appliances which may be destroyed by the extreme cold weather.
- This operation can be ON by pressing the +8/10°C heat button on the remote control.
- Two temperature settings are available, which are;
  - 8°C (Pressing TEMP down button at the remote control)
  - 10°C (Pressing TEMP up button at the remote control)
- During the operation of this mode;
  - The indoor fan speed will remain at Hi fan tap all the time included deice process.
  - Powerful operation, Quiet operation, Econavi operation and Fan Speed selection are disabled.
  - Cold draft prevention control is disabled.
- Control condition;



- **Caution!**

If the indoor temperature constantly is less than 0°C (Door, windows not close properly), the error code F11 may occur. This is because in open area, the indoor sensor will misjudge operation condition and will give error code.

13. Protection Control

13.1 Protection Control For All Operations

13.1.1 Restart Control (Time Delay Safety Control)

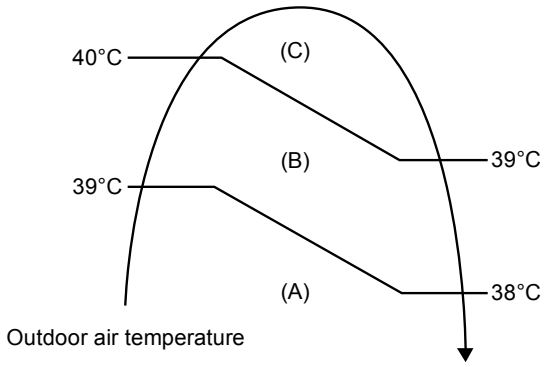
- The Compressor will not turn on within 3 minutes from the moment operation stops, although the unit is turned on again by pressing OFF/ON button at remote control within this period.
- This control is not applicable if the power supply is cut off and on again.
- This phenomenon is to balance the pressure inside the refrigerant cycle.

13.1.2 Total Running Current Control

1. When the outdoor unit total running current (AC) exceeds X value, the frequency instructed for compressor operation will be decreased.
2. If the running current does not exceed X value for 10 seconds, the frequency instructed will be increased.
3. However, if total outdoor unit running current exceeds Y value, compressor will be stopped immediately for 3 minutes.

Model	HE9PKE, AE9PKE		HE12PKE	
Operation Mode	X (A)	Y (A)	X (A)	Y (A)
Cooling / Soft Dry (A)	4.03	14.76	5.57	14.76
Cooling / Soft Dry (B)	3.51		5.03	
Cooling / Soft Dry (C)	3.51		5.03	
Heating	7.23		9.50	

4. The first 30 minutes of cooling operation, (A) will be applied.



13.1.3 IPM (Power Transistor) Prevention Control

A. Overheating Prevention Control

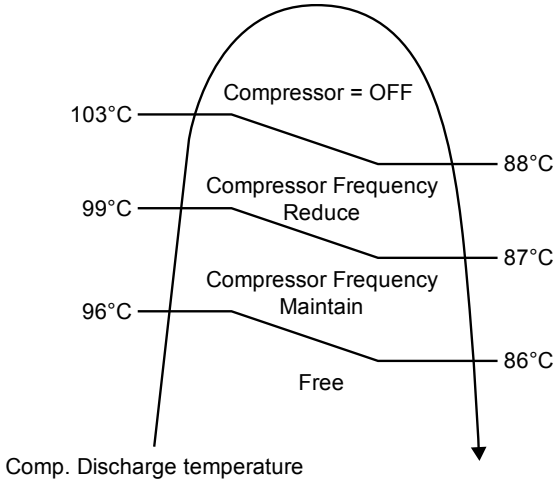
1. When the IPM temperature rises to 100°C, compressor operation will stop immediately.
2. Compressor operation restarts after 3 minutes the temperature decreases to 95°C.
3. If this condition repeats continuously 4 times within 20 minutes, timer LED will be blinking (“F96” is indicated).

B. DC Peak Current Control

1. When electric current to IPM exceeds set value of 20.2 A, the compressor will stop operate. Then, operation will restart after 3 minutes.
2. If the set value is exceeded again more than 30 seconds after the compressor starts, the operation will restart after 1 minute.
3. If the set value exceeded again within 30 seconds after the compressor starts, the operation will restart after 2 minutes. If this condition repeats continuously for 7 times, all indoor and outdoor relays will be cut off, timer LED will be blinking (“F99” is indicated).

13.1.4 Compressor Overheating Prevention Control

- Instructed frequency for compressor operation will be regulated by compressor discharge temperature. The changes of frequency are as below.
- If compressor discharge temperature exceeds 103°C, compressor will be stopped, occurs 4 times per 20 minutes, timer LED will be blinking. ("F97" is indicated.)



13.1.5 Low Pressure Prevention Control (Gas Leakage Detection)

a. Control start conditions

- For 5 minutes, the compressor continuously operates and outdoor total current is between 0.6A and 1.15A.
- During Cooling and Soft Dry operations:
  Indoor suction temperature - indoor piping temperature is below 4°C.
- During Heating operations :
  Indoor piping temperature - indoor suction is under 5°C.

b. Control contents

- Compressor stops (and restart after 3 minutes).
- If the conditions above happen 2 times within 20 minutes, the unit will:
  - Stop operation
  - Timer LED blinks and "F91" indicated.

13.1.6 Low Frequency Protection Control 1

- When the compressor operate at frequency lower than 24 Hz continued for 240 minutes, the operation frequency will be changed to 23 Hz for 2 minutes.

13.1.7 Low Frequency Protection Control 2

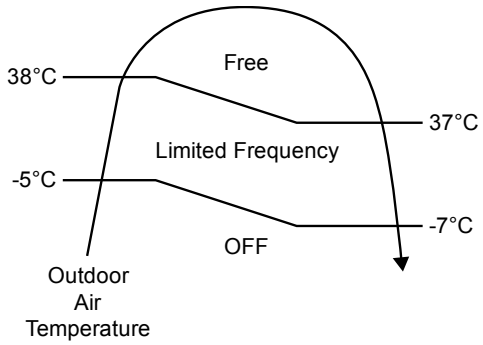
- When all the below conditions comply, the compressor frequency will change to lower frequency.

Temperature, T, for:	Cooling / Soft Dry	Heating
Indoor intake air (°C)	T < 14 or T ≥ 30	T < 14 or T ≥ 28
Outdoor air (°C)	T < 13 or T ≥ 38	T < 4 or T ≥ 24
Indoor heat exchanger (°C)	T < 30	T < 0

13.2 Protection Control For Cooling & Soft Dry Operation

13.2.1 Outdoor Air Temperature Control

- The compressor operating frequency is regulated in accordance to the outdoor air temperature as shown in the diagram below.
- This control will begin 1 minute after the compressor starts.
- Compressor frequency will adjust base on outdoor air temperature.



13.2.2 Cooling Overload Control

- Detects the Outdoor pipe temperature and carry out below restriction/limitation (Limit the compressor Operation frequency)
- The compressor stop if outdoor pipe temperature exceeds 61°C.
- If the compressor stops 4 times in 20 minutes, Timer LED blinking (F95 indicated: outdoor high pressure rise protection)

13.2.3 Freeze Prevention Control 1

1. When indoor heat exchanger temperature is lower than 0°C continuously for 6 minutes, compressor will stop operating.
2. Compressor will resume its operation 3 minutes after the indoor heat exchanger is higher than 5°C.
3. At the same time, indoor fan speed will be higher than during its normal operation.
4. If indoor heat exchanger temperature is higher than 5°C for 5 minutes, the fan speed will return to its normal operation.

13.2.4 Freeze Prevention Control 2

1. Control start conditions
   - During Cooling operation and soft dry operation
     - During thermo OFF condition, indoor intake temperature is less than 10°C or
     - Compressor stops for freeze prevention control
   - Either one of the conditions above occurs 5 times in 60 minutes.

2. Control contents
   - Operation stops
   - Timer LED blinks and “H99” indicated

13.2.5 Dew Prevention Control 1

- To prevent dew formation at indoor unit discharge area.
- This control will be activated if:
  - Outdoor air temperature and Indoor pipe temperature judgment by microcontroller is fulfilled.
  - When Cooling or Dry mode is operated more than 20 minutes or more.
- This control stopped if:
  - Compressor stopped.
  - Remote control setting changed (fan speed / temperature).
  - Outdoor air temperature and indoor intake temperature changed.
- Fan speed, angle of louver (vertical airflow angle) will be adjusted accordingly in this control.
  - Fan speed will be increased slowly if the unit is in quiet mode but no change in normal cooling mode.

13.2.6 Dew Prevention Control 2

- To prevent dew formation at indoor unit discharge area.
- This control starts if all conditions continue for 20 minutes:
  - Operated with Cooling or Soft Dry Mode.
  - Indoor intake temperature is between 25°C and 29°C.
  - Outdoor air temperature is less than 30°C.
  - Quiet Lo fan speed.
- This control stopped if:
  - When receive air swing change signal from Remote Control.
- The horizontal airflow angle will be fixed at facing front.
- The vertical airflow angle will be fixed at 25° (Upper vane) 7° (Lower vane).

13.2.7 Odor Cut Control

- To reduce the odor released from the unit.
  - Start Condition
    - AUTO FAN Speed is selected during COOL or DRY operation.
    - During freeze prevention control and timer preliminary operation, this control is not applicable.
  - Control content
    - Depends on compressor conditions:
      - Compressor OFF → Compressor ON.
        The indoor unit fan stops temporarily and then starts to blow at minimum airflow for 30 seconds.
      - Compressor ON → Compressor OFF.
        The indoor unit fan stops for 90 seconds and then blows at minimum airflow for 20 seconds.

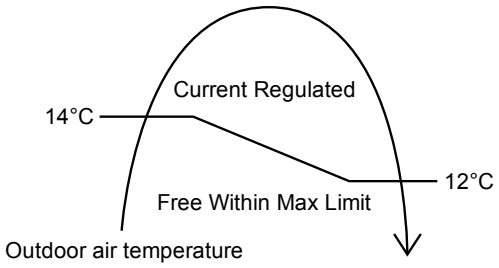
13.3 Protection Control For Heating Operation

13.3.1 Intake Air Temperature Control

Compressor will operate at limited freq., if indoor intake air temperature is 30°C or above.

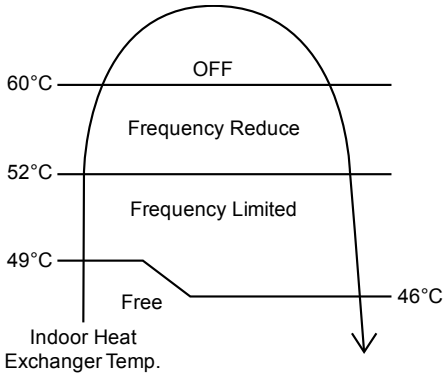
13.3.2 Outdoor Air Temperature Control

- The Max current value is regulated when the outdoor air temperature rise above 14°C in order to avoid compressor overloading.



13.3.3 Overload Protection Control

- The compressor operating frequency is regulated in accordance to indoor heat exchanger temperature as shown below.
- If the heat exchanger temperature exceeds 60°C, compressor will stop.



13.3.4 Compressor Oil Return Control

- When compressor starts, the compressor will be regulated for 240 seconds.

13.3.5 Cold Draught Prevention Control

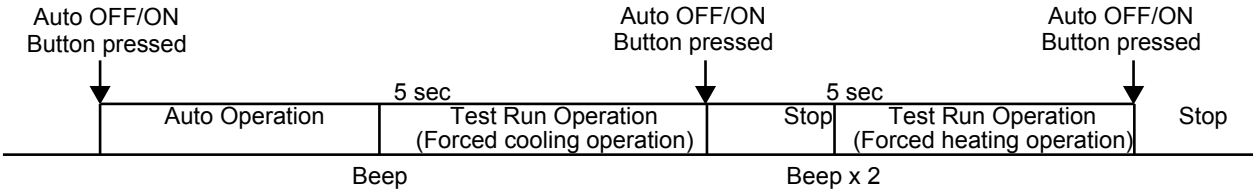
- When indoor pipe temperature is low, cold draught operation starts where indoor fan speed will be reduced.

13.3.6 Deice Operation

- When outdoor pipe temperature and outdoor air temperature is low, deice operation start where indoor fan motor and outdoor fan motor stop and the operation LED deice indicator ON during this operation.

14. Servicing Mode

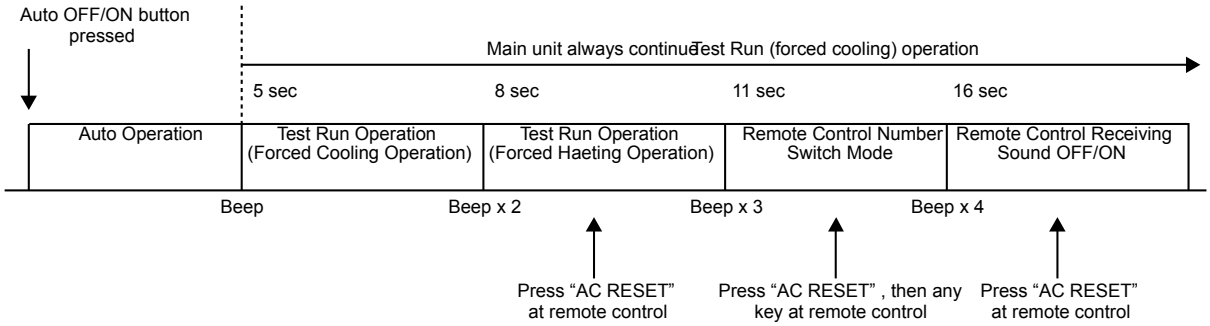
14.1 Auto OFF/ON Button



1 AUTO OPERATION MODE
The Auto operation will be activated immediately once the Auto OFF/ON button is pressed. This operation can be used to operate air conditioner with limited function if remote control is misplaced or malfunction.

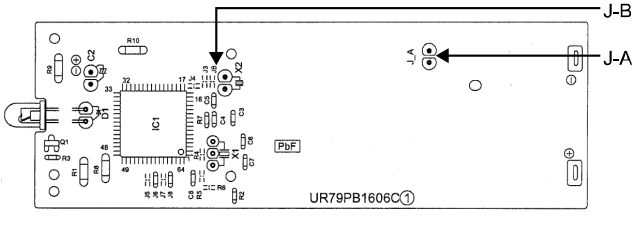
2 TEST RUN OPERATION (FOR PUMP DOWN/SERVICING PURPOSE)
The Test Run operation will be activated if the Auto OFF/ON button is pressed continuously for more than 5 seconds. A “beep” sound will occur at the fifth seconds, in order to identify the starting of Test Run operation (Forced cooling operation). Within 5 minutes after Forced cooling operation start, the Auto OFF/ON button is pressed for more than 5 seconds. A 2 “beep” sounds will occur at the fifth seconds, in order to identify the starting of Forced heating operation.

The Auto OFF/ON button may be used together with remote control to set / change the advance setting of air conditioner operation.



3 REMOTE CONTROL NUMBER SWITCH MODE
The Remote Control Number Switch Mode will be activated if the Auto OFF/ON button is pressed continuously for more than 11 seconds (3 “beep” sounds will occur at 11th seconds to identify the Remote Control Number Switch Mode is in standby condition) and press “AC RESET” button and then press any button at remote control to transmit and store the desired transmission code to the EEPROM.

There are 4 types of remote control transmission code could be selected and stored in EEPROM of indoor unit. The indoor unit will only operate when received signal with same transmission code from remote control. This could prevent signal interference when there are 2 or more indoor units installed nearby together.
To change remote control transmission code, short or open jumpers at the remote control printed circuit board.



Remote Control Printed Circuit Board		
Jumper A (J-A)	Jumper B (J-B)	Remote Control No.
Short	Open	A (Default)
Open	Open	B
Short	Short	C
Open	Short	D

- During Remote Control Number Switch Mode, press any button at remote control to transmit and store the transmission code to the EEPROM.

4 REMOTE CONTROL RECEIVING SOUND OFF/ON MODE
The Remote Control Receiving Sound OFF/ON Mode will be activated if the Auto OFF/ON button is pressed continuously for more than 16 seconds (4 “beep” sounds will occur at 16th seconds to identify the Remote Control Receiving Sound Off/On Mode is in standby condition) and press “AC Reset” button at remote control.

Press “Auto OFF/ON button” to toggle remote control receiving sound.
- Short “beep”: Turn OFF remote control receiving sound.
- Long “beep”: Turn ON remote control receiving sound.

After Auto OFF/ON Button is pressed, the 20 seconds counter for Remote Control Receiving Sound OFF/ON Mode is restarted.

14.2 Remote Control Button

14.2.1 SET BUTTON

- To check remote control transmission code and store the transmission code to EEPROM.
  - Press “Set” button for more than 10 seconds by using pointer.
  - Press “TIMER SET” button until a “beep” sound is heard as confirmation of transmission code changed.

14.2.2 RESET (RC)

- To clear and restore the remote control setting to factory default.
  - Press once to clear the memory.

14.2.3 RESET (AC)

- To restore the unit’s setting to factory default.
  - Press once to restore the unit’s setting.

14.2.4 TIMER ▲

- To change indoor unit indicator’s LED intensity.
  - Press continuously for 5 seconds.

14.2.5 TIMER ▼

- To change remote control display from Degree Celsius (°C) to Degree Fahrenheit (°F).
  - Press continuously for 10 seconds.

15. Troubleshooting Guide

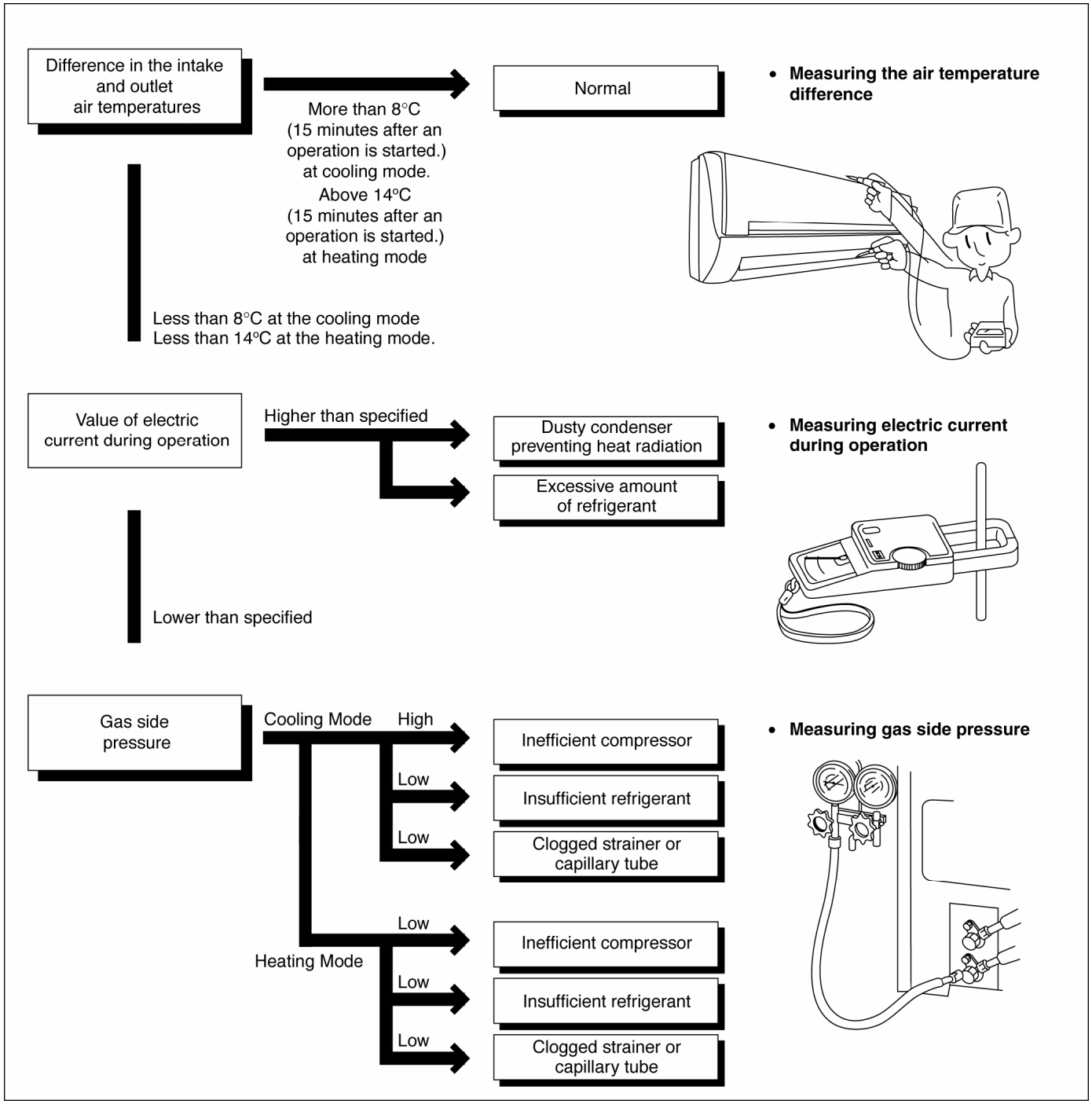
15.1 Refrigeration Cycle System

In order to diagnose malfunctions, make sure that there are no electrical problems before inspecting the refrigeration cycle.
Such problems include insufficient insulation, problem with the power source, malfunction of a compressor and a fan.
The normal outlet air temperature and pressure of the refrigeration cycle depends on various conditions, the standard values for them are shown in the table on the right.

Normal Pressure and Outlet Air Temperature (Standard)

	Gas pressure MPa (kg/cm²G)	Outlet air temperature (°C)
Cooling Mode	0.9 ~ 1.2 (9 ~ 12)	12 ~ 16
Heating Mode	2.3 ~ 2.9 (23 ~ 29)	36 ~ 45

★ Condition:
- Indoor fan speed; High
- Outdoor temperature 35°C at cooling mode and 7°C at heating mode.
- Compressor operates at rated frequency


Difference in the intake and outlet air temperatures
More than 8°C (15 minutes after an operation is started.) at cooling mode.
Above 14°C (15 minutes after an operation is started.) at heating mode
Normal
Less than 8°C at the cooling mode
Less than 14°C at the heating mode.
• Measuring the air temperature difference
Value of electric current during operation
Higher than specified
Dusty condenser preventing heat radiation
Excessive amount of refrigerant
Lower than specified
• Measuring electric current during operation
Gas side pressure
Cooling Mode
High
Low
Low
Inefficient compressor
Insufficient refrigerant
Clogged strainer or capillary tube
Heating Mode
Low
Low
Low
Inefficient compressor
Insufficient refrigerant
Clogged strainer or capillary tube
• Measuring gas side pressure

15.1.1 Relationship between the condition of the air conditioner and pressure and electric current

Condition of the air conditioner	Cooling Mode			Heating Mode		
	Low Pressure	High Pressure	Electric current during operation	Low Pressure	High Pressure	Electric current during operation
Insufficient refrigerant (gas leakage)	↘	↘	↘	↘	↘	↘
Clogged capillary tube or strainer	↘	↘	↘	↗	↗	↗
Short circuit in the indoor unit	↘	↘	↘	↗	↗	↗
Heat radiation deficiency of the outdoor unit	↗	↗	↗	↘	↘	↘
Inefficient compression	↗	↘	↘	↗	↘	↘

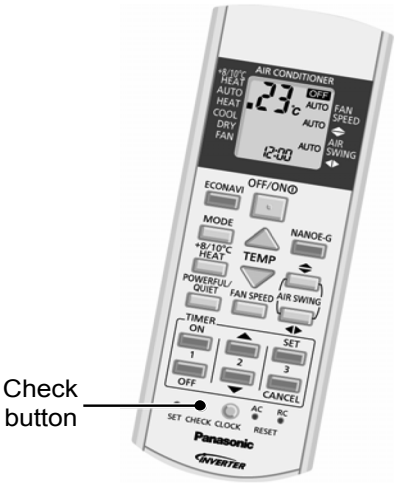
- Carry out the measurements of pressure, electric current, and temperature fifteen minutes after an operation is started.

15.2 Breakdown Self Diagnosis Function

15.2.1 Self Diagnosis Function (Three Digits Alphanumeric Code)

- Once abnormality has occurred during operation, the unit will stop its operation, and Timer LED blinks.
- Although Timer LED goes off when power supply is turned off, if the unit is operated under a breakdown condition, the LED will light up again.
- In operation after breakdown repair, the Timer LED will no more blink. The last error code (abnormality) will be stored in IC memory.

15.2.2 To Make a Diagnosis



1 Timer LED start to blink and the unit automatically stops the operation.
2 Press the CHECK button on the remote controller continuously for 5 seconds.
3 "- -" will be displayed on the remote controller display.
Note: Display only for "- -". (No transmitting signal, no receiving sound and no Power LED blinking.)
4 Press the "TIMER" ▲ or ▼ button on the remote controller. The code "H00" (no abnormality) will be displayed and signal will be transmitted to the main unit.
5 Every press of the button (up or down) will increase abnormality numbers and transmit abnormality code signal to the main unit.
6 When the latest abnormality code on the main unit and code transmitted from the remote controller are matched, power LED will light up for 30 seconds and a beep sound (continuously for 4 seconds) will be heard. If no codes are matched, power LED will light up for 0.5 seconds and no sound will be heard.
7 The breakdown diagnosis mode will be canceled unless pressing the CHECK button continuously for 5 seconds or operating the unit for 30 seconds.
8 The LED will be off if the unit is turned off or the RESET button on the main unit is pressed.

15.2.3 To Display Memorized Error (Protective Operation) Status

1 Turn power on.
2 Press the CHECK button on the remote controller continuously for 5 seconds
3 "- -" will be displayed on the remote controller display.
Note: Display only for "- -". (No transmitting signal, no receiving sound and no Power LED blinking.)
4 Press the "TIMER" ▲ or ▼ button on the remote controller. The code "H00" (no abnormality) will be displayed and signal will be transmitted to the main unit.
The power LED lights up. If no abnormality is stored in the memory, three beeps sound will be heard.
5 Every press of the button (up or down) will increase abnormality numbers and transmit abnormality code signal to the main unit.
6 When the latest abnormality code on the main unit and code transmitted from the remote controller are matched, power LED will light up for 30 seconds and a beep sound (continuously for 4 seconds) will be heard. If no codes are matched, power LED will light up for 0.5 seconds and no sound will be heard.
7 The breakdown diagnosis mode will be canceled unless pressing the CHECK button continuously for 5 seconds or operating the unit for 30 seconds.
8 The same diagnosis can be repeated by turning power on again.

15.2.4 To Clear Memorized Error (Protective Operation) Status after Repair:

1 Turn power on (in standby condition).
2 Press the AUTO button for 5 seconds (A beep receiving sound) on the main unit to operate the unit at Forced Cooling Operation modes.
3 Press the CHECK button on the remote controller for about 1 second with a pointed object to transmit signal to main unit. A beep sound is heard from main unit and the data is cleared.

15.2.5 Temporary Operation (Depending On Breakdown Status)

1 Press the AUTO button (A beep receiving sound) on the main unit to operate the unit. (Remote control will become possible.)
2 The unit can temporarily be used until repaired.

15.3 Error Code Table

Diagnosis display	Abnormality / Protection control	Abnormality Judgment	Protection Operation	Problem	Check location
H00	No memory of failure	—	Normal operation	—	—
H11	Indoor/outdoor abnormal communication	After operation for 1 minute	Indoor fan only operation can start by entering into force cooling operation	Indoor/outdoor communication not establish	• Indoor/outdoor wire terminal • Indoor/outdoor PCB • Indoor/outdoor connection wire
H12	Indoor unit capacity unmatched	90s after power supply	—	Total indoor capability more than maximum limit or less than minimum limit, or number of indoor unit less than two	• Indoor/outdoor connection wire • Indoor/outdoor PCB • Specification and combination table in catalogue
H14	Indoor intake air temperature sensor abnormality	Continuous for 5s	—	Indoor intake air temperature sensor open or short circuit	• Indoor intake air temperature sensor lead wire and connector
H15	Compressor temperature sensor abnormality	Continuous for 5s	—	Compressor temperature sensor open or short circuit	• Compressor temperature sensor lead wire and connector
H16	Outdoor current transformer (CT) abnormality	—	—	Current transformer faulty or compressor faulty	• Outdoor PCB faulty or compressor faulty
H19	Indoor fan motor merchanism lock	Continuous happen for 7 times	—	Indoor fan motor lock or feedback abnormal	• Fan motor lead wire and connector • Fan motor lock or block
H23	Indoor heat exchanger temperature sensor abnormality	Continuous for 5s	—	Indoor heat exchanger temperature sensor open or short circuit	• Indoor heat exchanger temperature sensor lead wire and connector
H24	Indoor heat exchanger temperature sensor 2 abnormality	Continuous for 5s	—	Indoor heat exchanger temperature sensor 2 open or short circuit	• Indoor heat exchanger temperature sensor 2 lead wire and connector
H25	Indoor ion device abnormality	Port is ON for 10s during ion device off	—	—	• ion device PCB
H27	Outdoor air temperature sensor abnormality	Continuous for 5s	—	Outdoor air temperature sensor open or short circuit	• Outdoor air temperature sensor lead wire and connector
H28	Outdoor heat exchanger temperature sensor 1 abnormality	Continuous for 5s	—	Outdoor heat exchanger temperature sensor 1 open or short circuit	• Outdoor heat exchanger temperature sensor 1 lead wire and connector
H30	Outdoor discharge pipe temperature sensor abnormality	Continuous for 5s	—	Outdoor discharge pipe temperature sensor open or short circuit	• Outdoor discharge pipe temperature sensor lead wire and connector
H32	Outdoor heat exchanger temperature sensor 2 abnormality	Continuous for 5s	—	Outdoor heat exchanger temperature sensor 2 open or short circuit	• Outdoor heat exchanger temperature sensor 2 lead wire and connector
H33	Indoor / outdoor misconnection abnormality	—	—	Indoor and outdoor rated voltage different	• Indoor and outdoor units check
H34	Outdoor heat sink temperature sensor abnormality	Continuous for 2s	—	Outdoor heat sink temperature sensor open or short circuit	• Outdoor heat sink sensor
H36	Outdoor gas pipe temperature sensor abnormality	Continuous for 5s	Heating protection operation only	Outdoor gas pipe temperature sensor open or short circuit	• Outdoor gas pipe temperature sensor lead wire and connector
H37	Outdoor liquid pipe temperature sensor abnormality	Continuous for 5s	Cooling protection operation only	Outdoor liquid pipe temperature sensor open or short circuit	• Outdoor liquid pipe temperature sensor lead wire and connector
H38	Indoor/Outdoor mismatch (brand code)	—	—	Brand code not match	• Check indoor unit and outdoor unit
H39	Abnormal indoor operating unit or standby units	3 times happen within 40 minutes	—	Wrong wiring and connecting pipe, expansion valve abnormality, indoor heat exchanger sensor open circuit	• Check indoor/outdoor connection wire and connection pipe • Indoor heat exchanger sensor lead wire and connector • Expansion valve and lead wire and connector
H41	Abnormal wiring or piping connection	—	—	Wrong wiring and connecting pipe, expansion valve abnormality	• Check indoor/outdoor connection wire and connection pipe • Expansion valve and lead wire and connector

H59	ECO sensor abnormality	Continuous for 70s	—	ECO sensor open or short circuit	• ECO sensor • ECO and Indoor PCB
H64	Outdoor high pressure sensor abnormality	Continuous for 1 minutes	—	High pressure sensor open circuit during compressor stop	• High pressure sensor • Lead wire and connector
H70	Light sensor abnormality	Continuous for 24 hours	—	Light sensor open or short circuit	• Light sensor • Indoor PCB
H97	Outdoor fan motor mechanism lock	2 times happen within 30 minutes	—	Outdoor fan motor lock or feedback abnormal	• Outdoor fan motor lead wire and connector • Fan motor lock or block
H98	Indoor high pressure protection	—	—	Indoor high pressure protection (Heating)	• Check indoor heat exchanger • Air filter dirty • Air circulation short circuit
H99	Indoor operating unit freeze protection	—	—	Indoor freeze protection (Cooling)	• Check indoor heat exchanger • Air filter dirty • Air circulation short circuit
F11	4-way valve switching abnormality	4 times happen within 30 minutes	—	4-way valve switching abnormal	• 4-way valve • Lead wire and connector
F17	Indoor standby units freezing abnormality	3 times happen within 40 minutes	—	Wrong wiring and connecting pipe, expansion valve leakage, indoor heat exchanger sensor open circuit	• Check indoor/outdoor connection wire and pipe • Indoor heat exchanger sensor lead wire and connector • Expansion valve lead wire and connector
F90	Power factor correction (PFC) circuit protection	4 times happen within 10 minutes	—	Power factor correction circuit abnormal	• Outdoor PCB faulty
F91	Refrigeration cycle abnormality	2 times happen within 20 minutes	—	Refrigeration cycle abnormal	• Insufficient refrigerant or valve close
F93	Compressor abnormal revolution	4 times happen within 20 minutes	—	Compressor abnormal revolution	• Power transistor module faulty or compressor lock
F94	Compressor discharge overshoot protection	4 times happen within 30 minutes	—	Compressor discharge pressure overshoot	• Check refrigeration system
F95	Outdoor cooling high pressure protection	4 times happen within 20 minutes	—	Cooling high pressure protection	• Check refrigeration system • Outdoor air circuit
F96	Power transistor module overheating protection	4 times happen within 30 minutes	—	Power transistor module overheat	• PCB faulty • Outdoor air circuit (fan motor)
F97	Compressor overheating protection	3 times happen within 30 minutes	—	Compressor overheat	• Insufficient refrigerant
F98	Total running current protection	3 times happen within 20 minutes	—	Total current protection	• Check refrigeration system • Power source or compressor lock
F99	Outdoor direct current (DC) peak detection	Continuous happen for 7 times	—	Power transistor module current protection	• Power transistor module faulty or compressor lock

15.4 Self-diagnosis Method

15.4.1 H11 (Indoor/Outdoor Abnormal Communication)

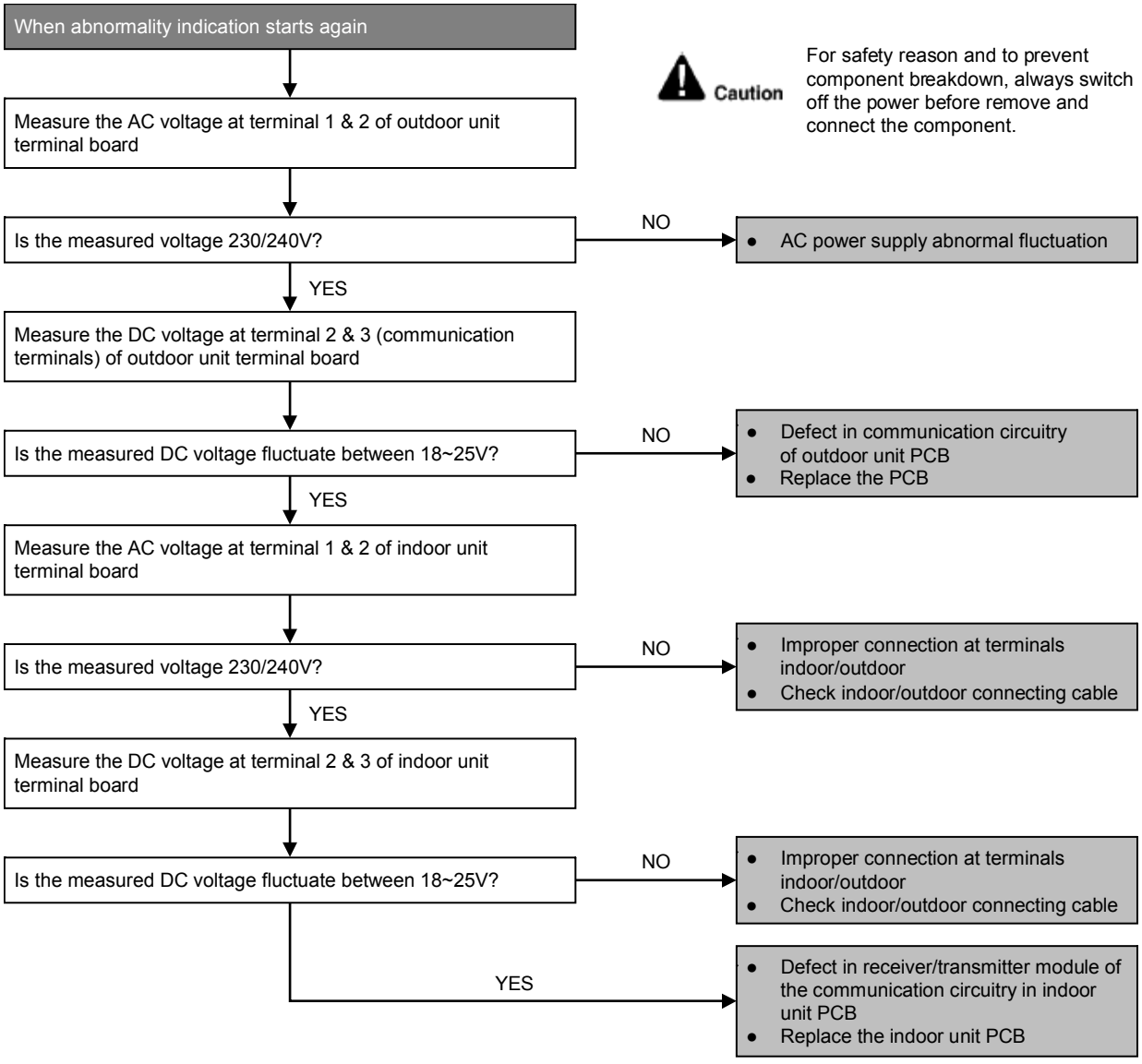
Malfunction Decision Conditions

- During startup and operation of cooling and heating, the data received from outdoor unit in indoor unit signal transmission is checked whether it is normal.

Malfunction Caused

- Faulty indoor unit PCB.
- Faulty outdoor unit PCB.
- Indoor unit-outdoor unit signal transmission error due to wiring error.
- Indoor unit-outdoor unit signal transmission error due to breaking of wire in the connection wires between the indoor and outdoor units.

Troubleshooting


When abnormality indication starts again
Caution
For safety reason and to prevent component breakdown, always switch off the power before remove and connect the component.
Measure the AC voltage at terminal 1 & 2 of outdoor unit terminal board
Is the measured voltage 230/240V?
NO
AC power supply abnormal fluctuation
YES
Measure the DC voltage at terminal 2 & 3 (communication terminals) of outdoor unit terminal board
Is the measured DC voltage fluctuate between 18~25V?
NO
Defect in communication circuitry of outdoor unit PCB
Replace the PCB
YES
Measure the AC voltage at terminal 1 & 2 of indoor unit terminal board
Is the measured voltage 230/240V?
NO
Improper connection at terminals indoor/outdoor
Check indoor/outdoor connecting cable
YES
Measure the DC voltage at terminal 2 & 3 of indoor unit terminal board
Is the measured DC voltage fluctuate between 18~25V?
NO
Improper connection at terminals indoor/outdoor
Check indoor/outdoor connecting cable
YES
Defect in receiver/transmitter module of the communication circuitry in indoor unit PCB
Replace the indoor unit PCB

15.4.2 H12 (Indoor/Outdoor Capacity Rank Mismatched)

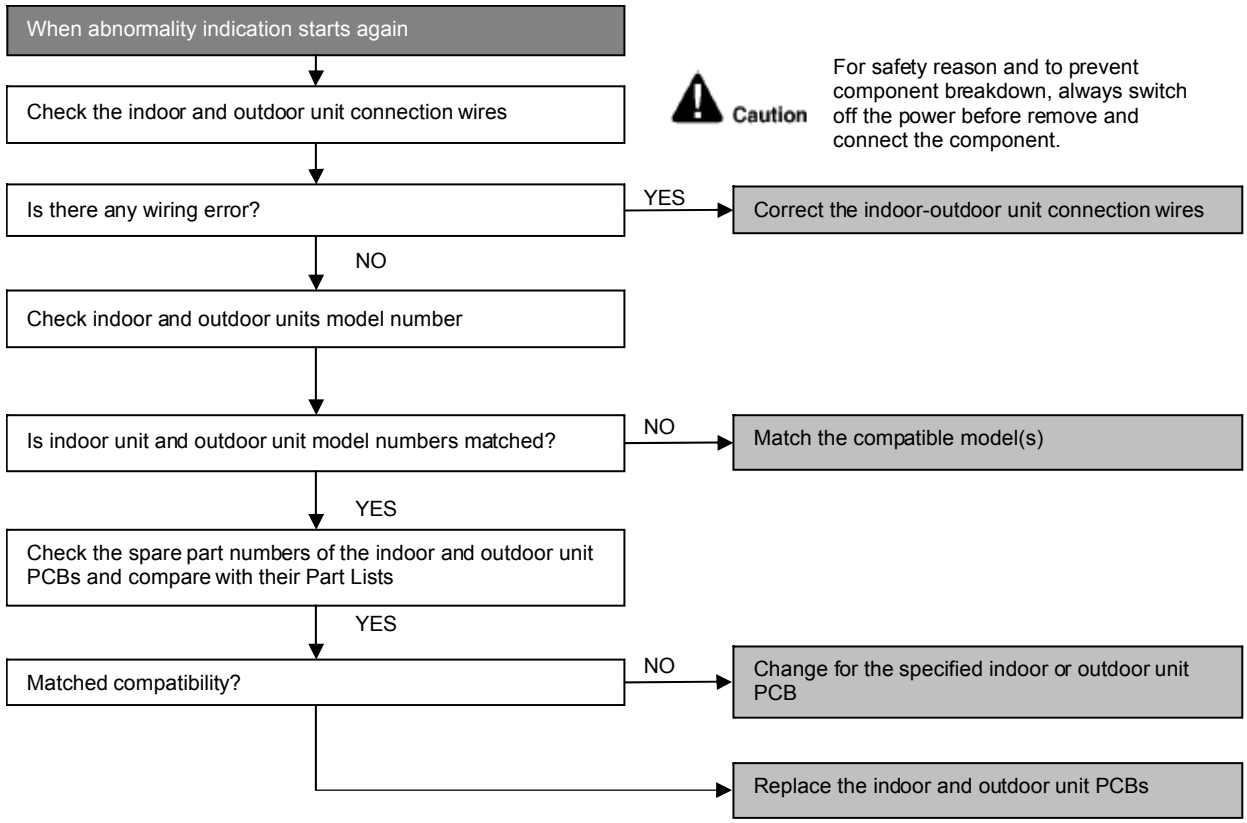
Malfunction Decision Conditions

- During startup, error code appears when different types of indoor and outdoor units are interconnected.

Malfunction Caused

- Wrong models interconnected.
- Wrong indoor unit or outdoor unit PCBs mounted.
- Indoor unit or outdoor unit PCBs defective.
- Indoor-outdoor unit signal transmission error due to wrong wiring.
- Indoor-outdoor unit signal transmission error due to breaking of wire 3 in the connection wires between the indoor and outdoor units.

Troubleshooting


When abnormality indication starts again
Check the indoor and outdoor unit connection wires
Caution
For safety reason and to prevent component breakdown, always switch off the power before remove and connect the component.
Is there any wiring error?
YES
Correct the indoor-outdoor unit connection wires
NO
Check indoor and outdoor units model number
Is indoor unit and outdoor unit model numbers matched?
NO
Match the compatible model(s)
YES
Check the spare part numbers of the indoor and outdoor unit PCBs and compare with their Part Lists
YES
Matched compatibility?
NO
Change for the specified indoor or outdoor unit PCB
Replace the indoor and outdoor unit PCBs

15.4.3 H14 (Indoor Intake Air Temperature Sensor Abnormality)

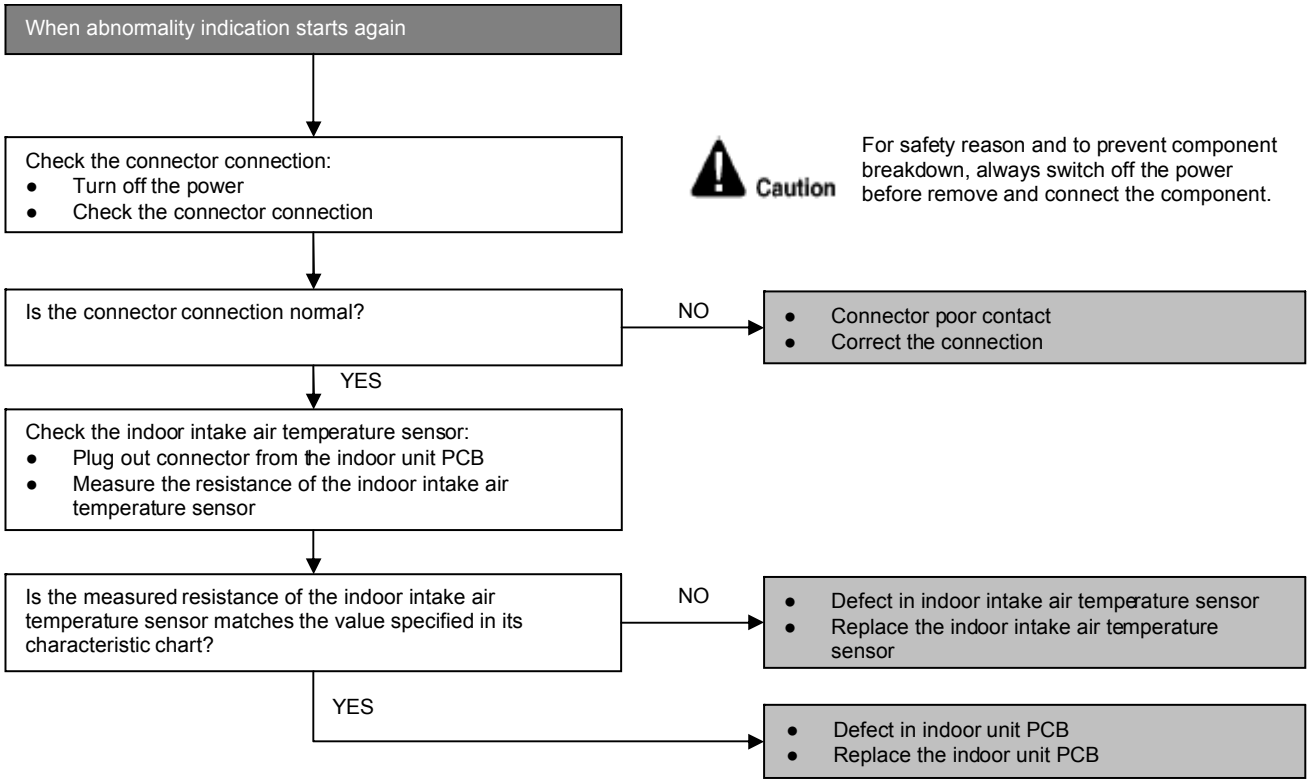
Malfunction Decision Conditions

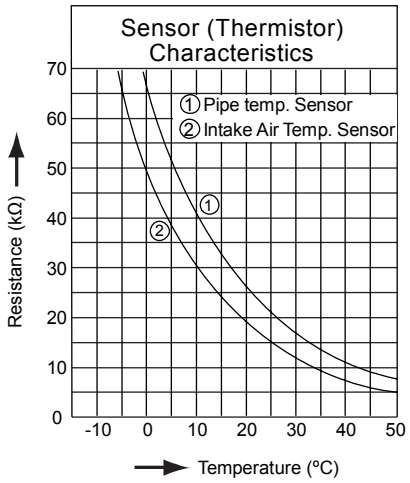
- During startup and operation of cooling and heating, the temperatures detected by the indoor intake air temperature sensor are used to determine sensor errors.

Malfunction Caused

- Faulty connector connection.
- Faulty sensor.
- Faulty PCB.

Troubleshooting


When abnormality indication starts again
Check the connector connection:
• Turn off the power
• Check the connector connection
Caution
For safety reason and to prevent component breakdown, always switch off the power before remove and connect the component.
Is the connector connection normal?
NO
• Connector poor contact
• Correct the connection
YES
Check the indoor intake air temperature sensor:
• Plug out connector from the indoor unit PCB
• Measure the resistance of the indoor intake air temperature sensor
Is the measured resistance of the indoor intake air temperature sensor matches the value specified in its characteristic chart?
NO
• Defect in indoor intake air temperature sensor
• Replace the indoor intake air temperature sensor
YES
• Defect in indoor unit PCB
• Replace the indoor unit PCB



15.4.4 H15 (Compressor Temperature Sensor Abnormality)

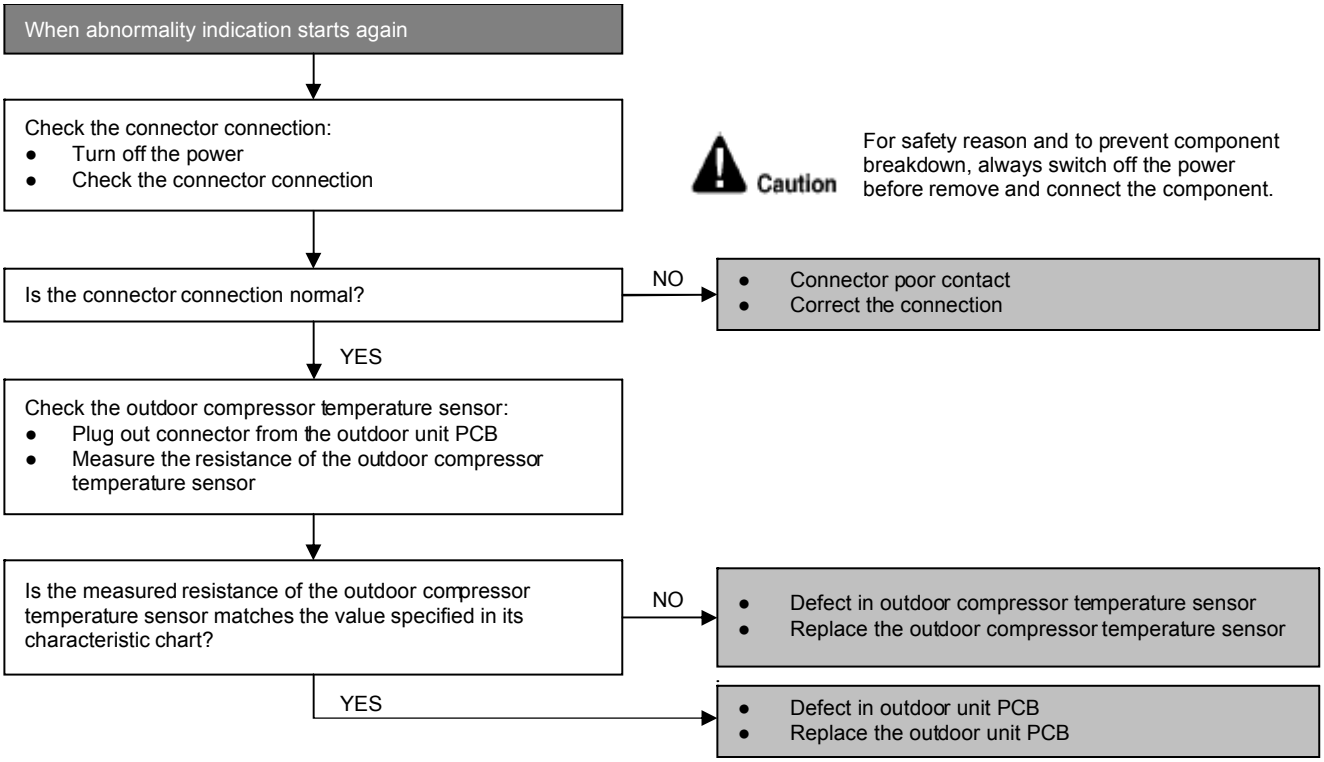
Malfunction Decision Conditions

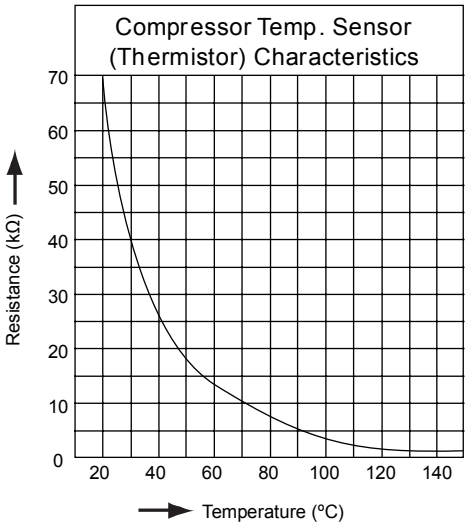
- During startup and operation of cooling and heating, the temperatures detected by the outdoor compressor temperature sensor are used to determine sensor errors.

Malfunction Caused

- Faulty connector connection.
- Faulty sensor.
- Faulty PCB.

Troubleshooting


When abnormality indication starts again
Check the connector connection:
● Turn off the power
● Check the connector connection
Caution
For safety reason and to prevent component breakdown, always switch off the power before remove and connect the component.
Is the connector connection normal?
NO
● Connector poor contact
● Correct the connection
YES
Check the outdoor compressor temperature sensor:
● Plug out connector from the outdoor unit PCB
● Measure the resistance of the outdoor compressor temperature sensor
Is the measured resistance of the outdoor compressor temperature sensor matches the value specified in its characteristic chart?
NO
● Defect in outdoor compressor temperature sensor
● Replace the outdoor compressor temperature sensor
YES
● Defect in outdoor unit PCB
● Replace the outdoor unit PCB



15.4.5 H16 (Outdoor Current Transformer)

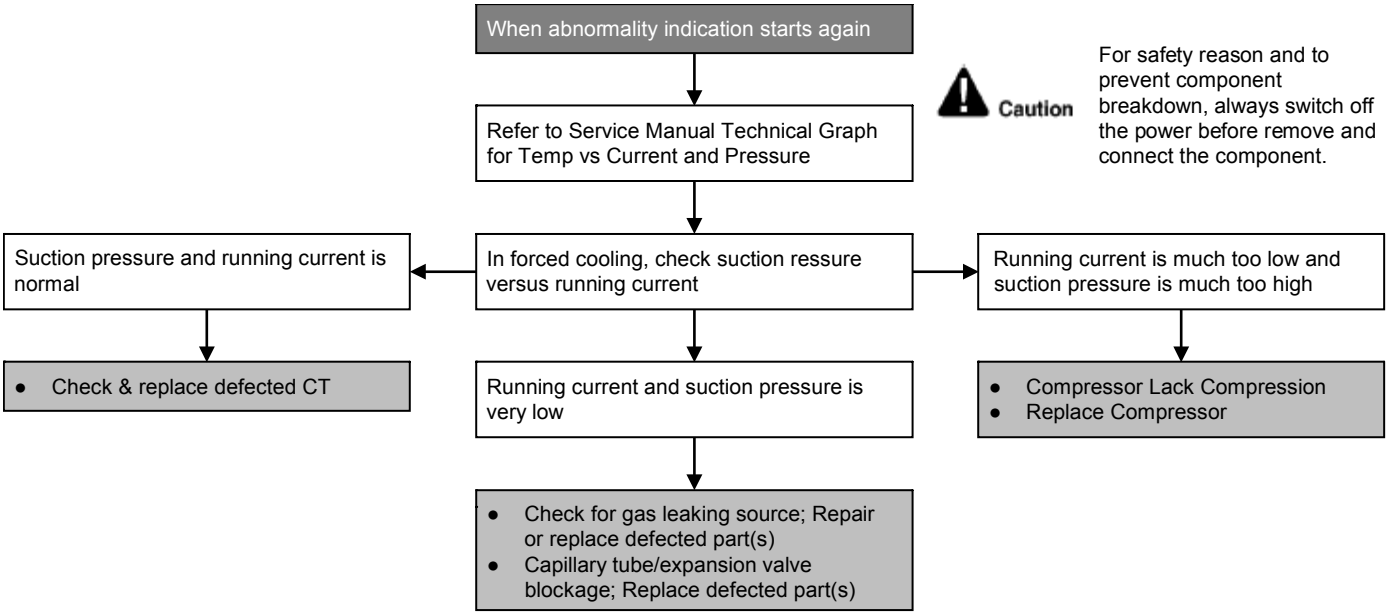
Malfunction Decision Conditions

- An input current, detected by Current Transformer CT, is below threshold value when the compressor is operating at certain frequency value for 3 minutes.

Malfunction Caused

- Lack of gas
- Broken CT (current transformer)
- Broken Outdoor PCB

Troubleshooting


When abnormality indication starts again
Refer to Service Manual Technical Graph for Temp vs Current and Pressure
Caution
For safety reason and to prevent component breakdown, always switch off the power before remove and connect the component.
In forced cooling, check suction ressure versus running current
Suction pressure and running current is normal
Check & replace defected CT
Running current and suction pressure is very low
Check for gas leaking source; Repair or replace defected part(s)
Capillary tube/expansion valve blockage; Replace defected part(s)
Running current is much too low and suction pressure is much too high
Compressor Lack Compression
Replace Compressor

15.4.6 H19 (Indoor Fan Motor – DC Motor Mechanism Locked)

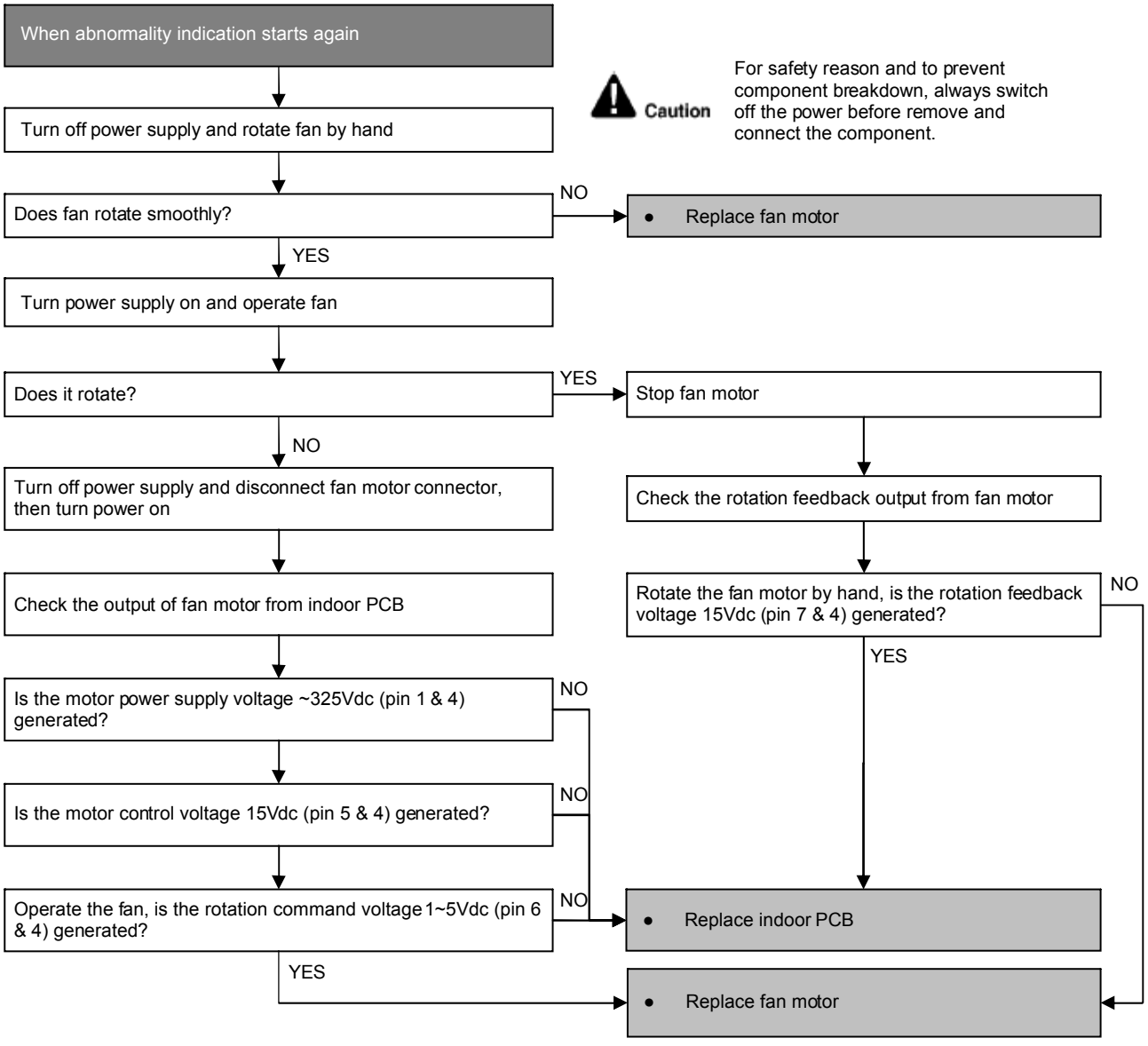
Malfunction Decision Conditions

- The rotation speed detected by the Hall IC during fan motor operation is used to determine abnormal fan motor (feedback of rotation > 2550rpm or < 50rpm)

Malfunction Caused

- Operation stops due to short circuit inside the fan motor winding.
- Operation stops due to breaking of wire inside the fan motor.
- Operation stops due to breaking of fan motor lead wires.
- Operation stops due to Hall IC malfunction.
- Operation error due to faulty indoor unit PCB.

Troubleshooting


When abnormality indication starts again
Caution
For safety reason and to prevent component breakdown, always switch off the power before remove and connect the component.
Turn off power supply and rotate fan by hand
Does fan rotate smoothly?
NO
Replace fan motor
YES
Turn power supply on and operate fan
Does it rotate?
YES
Stop fan motor
NO
Turn off power supply and disconnect fan motor connector, then turn power on
Check the rotation feedback output from fan motor
Check the output of fan motor from indoor PCB
Rotate the fan motor by hand, is the rotation feedback voltage 15Vdc (pin 7 & 4) generated?
NO
YES
Is the motor power supply voltage ~325Vdc (pin 1 & 4) generated?
NO
Is the motor control voltage 15Vdc (pin 5 & 4) generated?
NO
Operate the fan, is the rotation command voltage 1~5Vdc (pin 6 & 4) generated?
NO
Replace indoor PCB
YES
Replace fan motor

15.4.7 H23 (Indoor Pipe Temperature Sensor Abnormality)

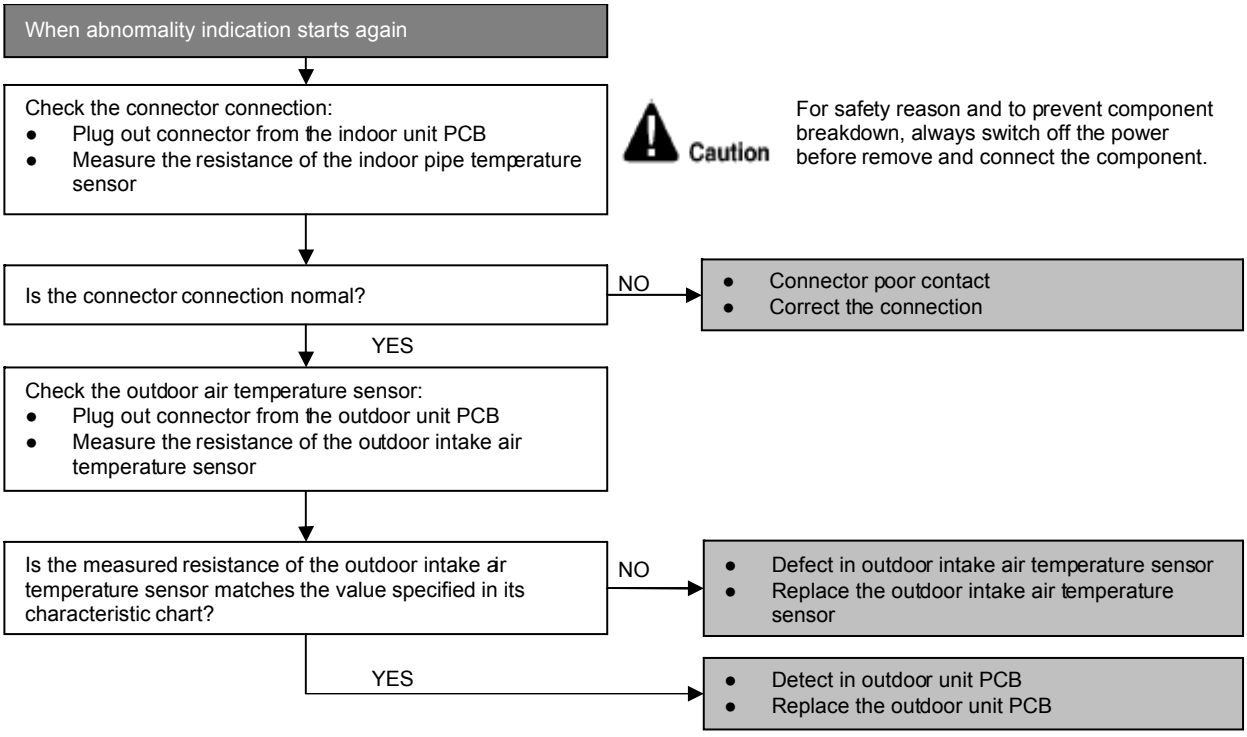
Malfunction Decision Conditions

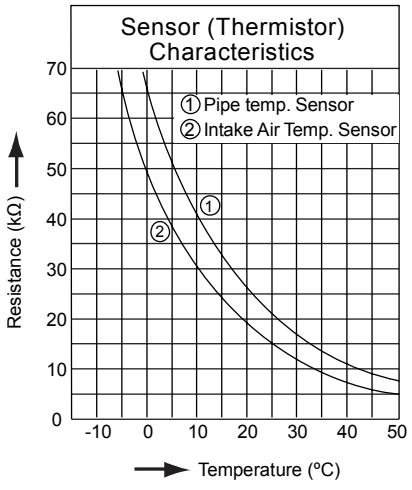
- During startup and operation of cooling and heating, the temperatures detected by the indoor heat exchanger temperature sensor are used to determine sensor errors.

Malfunction Caused

- Faulty connector connection.
- Faulty sensor.
- Faulty PCB.

Troubleshooting


When abnormality indication starts again
Check the connector connection:
• Plug out connector from the indoor unit PCB
• Measure the resistance of the indoor pipe temperature sensor
Caution
For safety reason and to prevent component breakdown, always switch off the power before remove and connect the component.
Is the connector connection normal?
NO
• Connector poor contact
• Correct the connection
YES
Check the outdoor air temperature sensor:
• Plug out connector from the outdoor unit PCB
• Measure the resistance of the outdoor intake air temperature sensor
Is the measured resistance of the outdoor intake air temperature sensor matches the value specified in its characteristic chart?
NO
• Defect in outdoor intake air temperature sensor
• Replace the outdoor intake air temperature sensor
YES
• Detect in outdoor unit PCB
• Replace the outdoor unit PCB



15.4.8 H27 (Outdoor Air Temperature Sensor Abnormality)

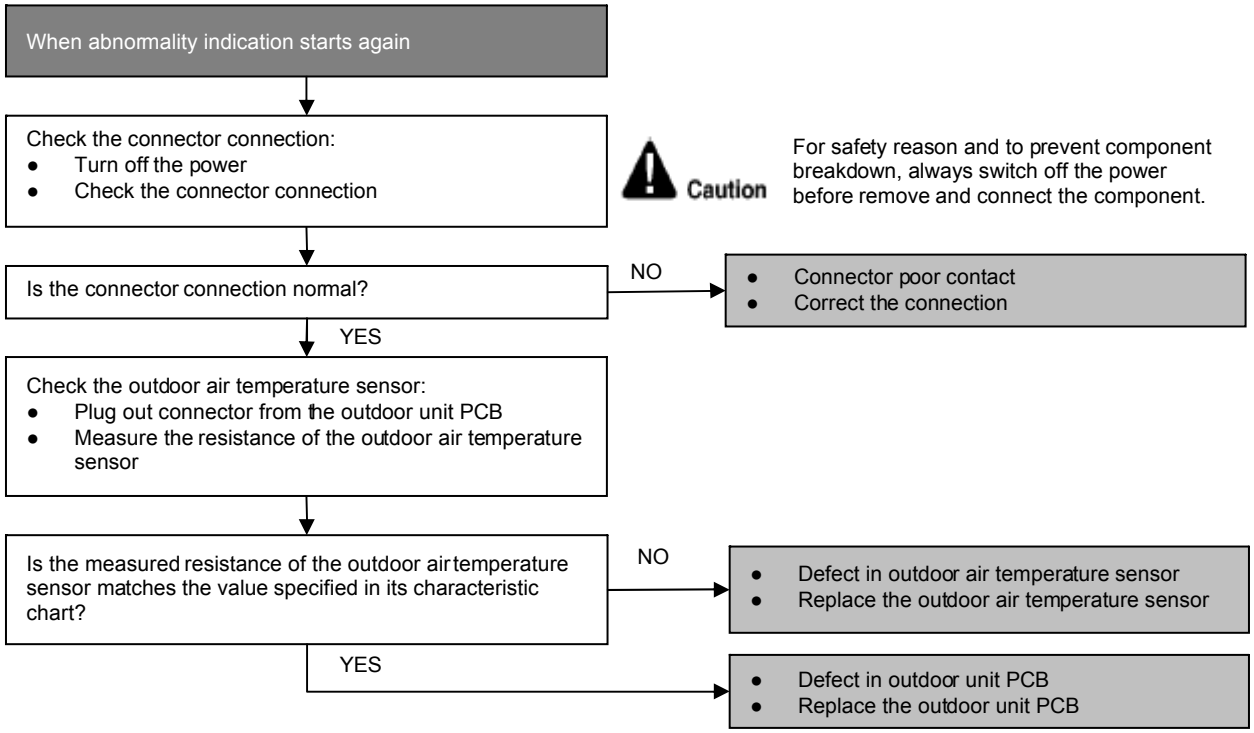
Malfunction Decision Conditions

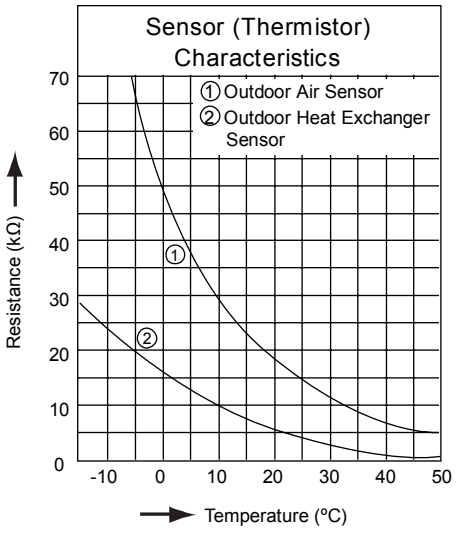
- During startup and operation of cooling and heating, the temperatures detected by the outdoor air temperature sensor are used to determine sensor errors.

Malfunction Caused

- Faulty connector connection.
- Faulty sensor.
- Faulty PCB.

Troubleshooting


When abnormality indication starts again
Check the connector connection:
• Turn off the power
• Check the connector connection
Caution
For safety reason and to prevent component breakdown, always switch off the power before remove and connect the component.
Is the connector connection normal?
NO
• Connector poor contact
• Correct the connection
YES
Check the outdoor air temperature sensor:
• Plug out connector from the outdoor unit PCB
• Measure the resistance of the outdoor air temperature sensor
Is the measured resistance of the outdoor air temperature sensor matches the value specified in its characteristic chart?
NO
• Defect in outdoor air temperature sensor
• Replace the outdoor air temperature sensor
YES
• Defect in outdoor unit PCB
• Replace the outdoor unit PCB



15.4.9 H28 (Outdoor Pipe Temperature Sensor Abnormality)

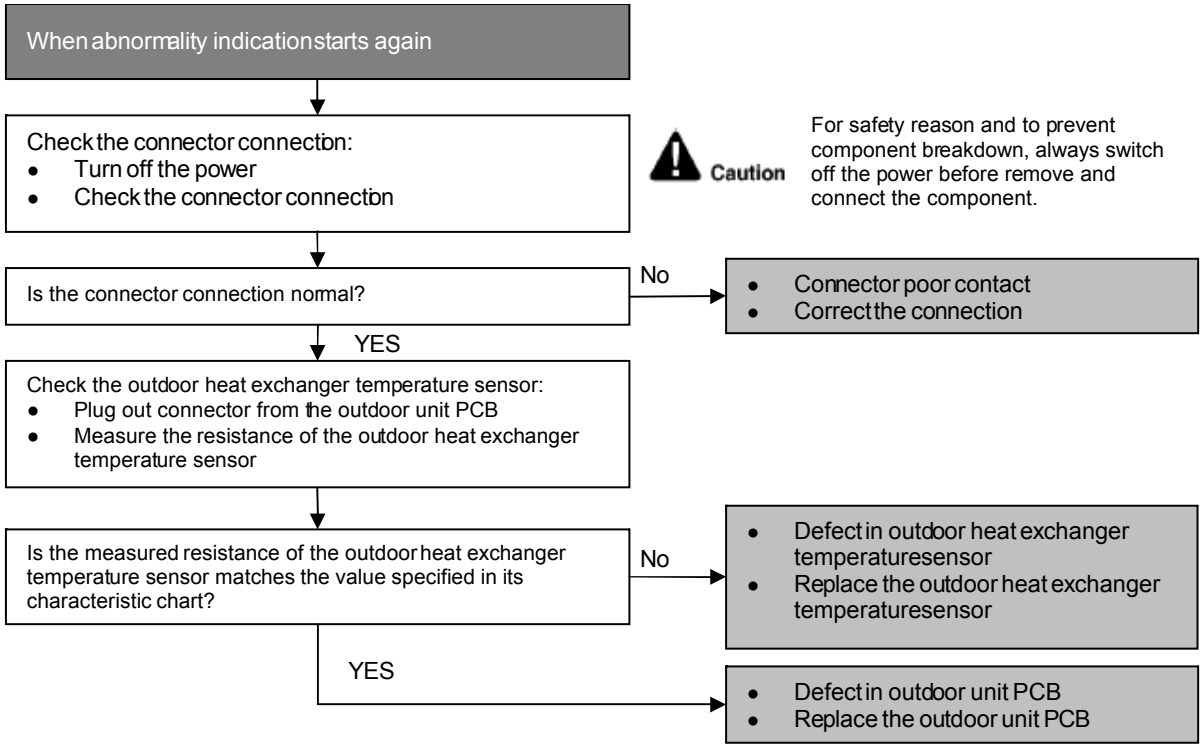
Malfunction Decision Conditions

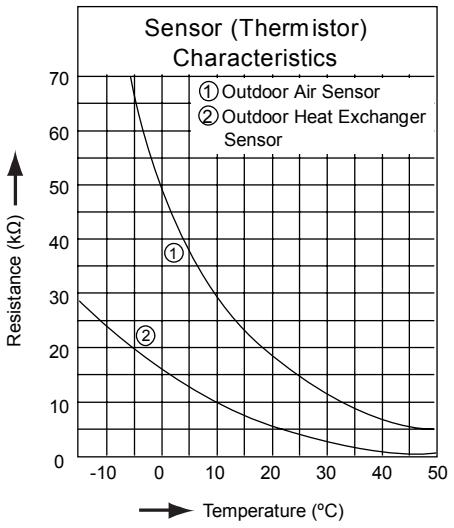
- During startup and operation of cooling and heating, the temperatures detected by the outdoor pipe temperature sensor are used to determine sensor errors.

Malfunction Caused

- Faulty connector connection.
- Faulty sensor.
- Faulty PCB.

Troubleshooting


When abnormality indication starts again
Check the connector connection:
• Turn off the power
• Check the connector connection
Caution
For safety reason and to prevent component breakdown, always switch off the power before remove and connect the component.
Is the connector connection normal?
No
• Connector poor contact
• Correct the connection
YES
Check the outdoor heat exchanger temperature sensor:
• Plug out connector from the outdoor unit PCB
• Measure the resistance of the outdoor heat exchanger temperature sensor
Is the measured resistance of the outdoor heat exchanger temperature sensor matches the value specified in its characteristic chart?
No
• Defect in outdoor heat exchanger temperature sensor
• Replace the outdoor heat exchanger temperature sensor
YES
• Defect in outdoor unit PCB
• Replace the outdoor unit PCB



15.4.10 H30 (Compressor Discharge Temperature Sensor Abnormality)

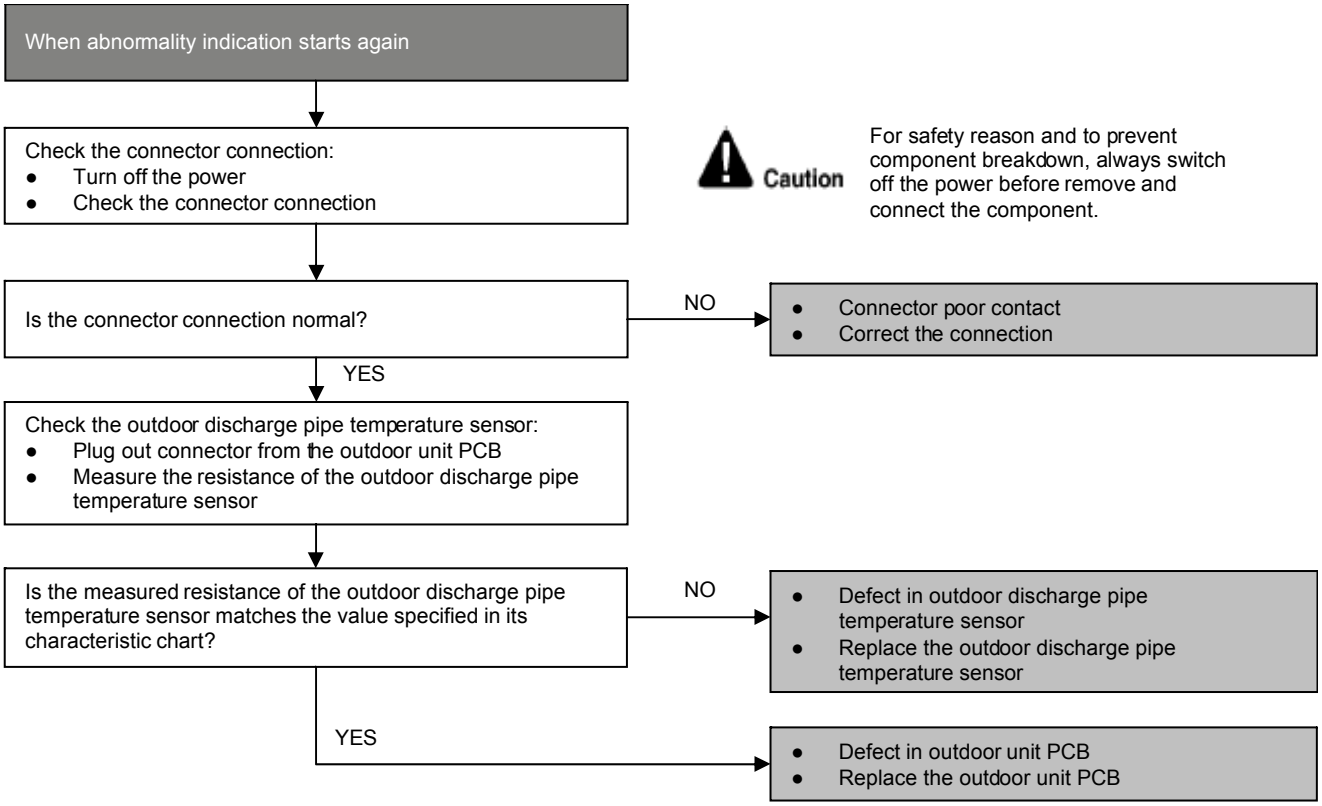
Malfunction Decision Conditions

- During startup and operation of cooling and heating, the temperatures detected by the outdoor discharge pipe temperature sensor are used to determine sensor errors.

Malfunction Caused

- Faulty connector connection.
- Faulty sensor.
- Faulty PCB.

Troubleshooting


When abnormality indication starts again
Check the connector connection:
Turn off the power
Check the connector connection
Caution
For safety reason and to prevent component breakdown, always switch off the power before remove and connect the component.
Is the connector connection normal?
NO
Connector poor contact
Correct the connection
YES
Check the outdoor discharge pipe temperature sensor:
Plug out connector from the outdoor unit PCB
Measure the resistance of the outdoor discharge pipe temperature sensor
Is the measured resistance of the outdoor discharge pipe temperature sensor matches the value specified in its characteristic chart?
NO
Defect in outdoor discharge pipe temperature sensor
Replace the outdoor discharge pipe temperature sensor
YES
Defect in outdoor unit PCB
Replace the outdoor unit PCB

15.4.11 H32 (Outdoor Heat Exchanger Temperature Sensor 2 Abnormality)

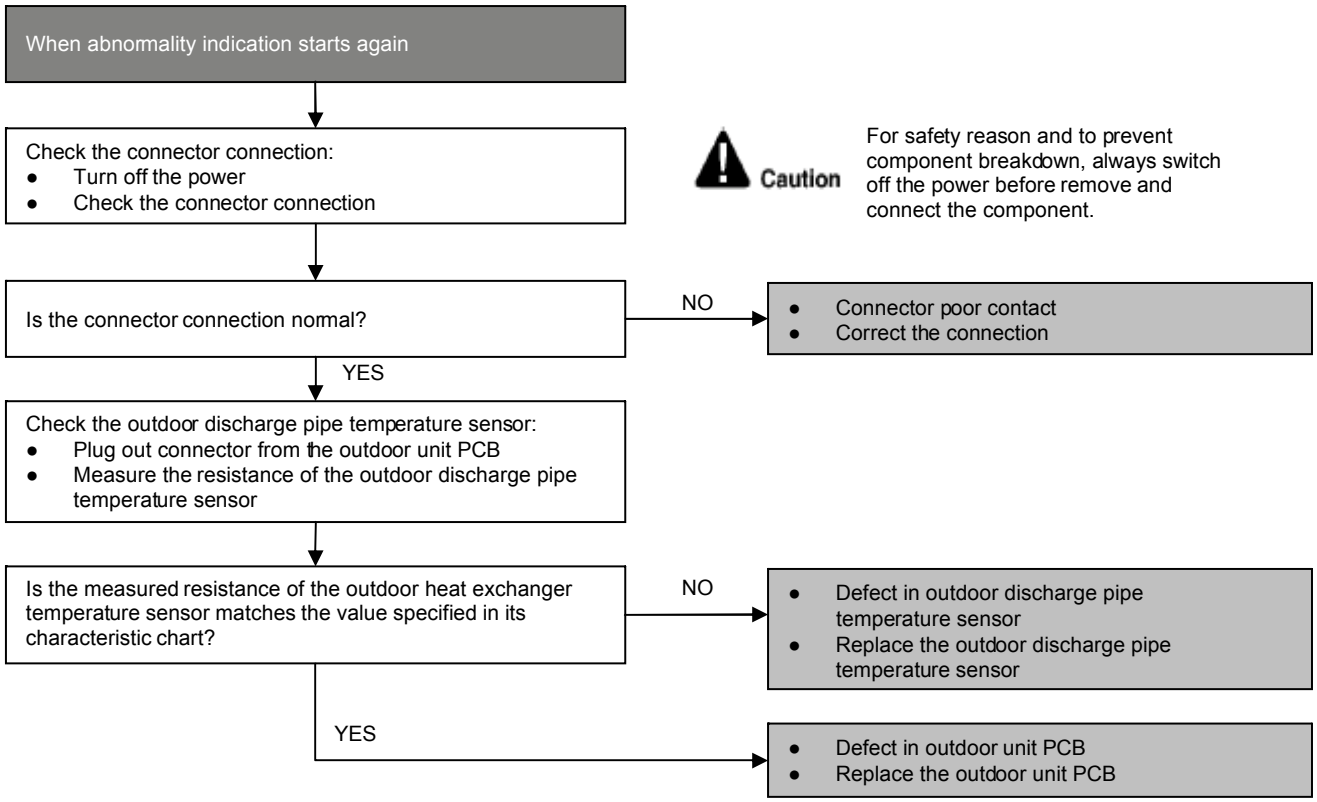
Malfunction Decision Conditions

- During startup and operation of cooling and heating, the temperatures detected by the outdoor heat exchanger temperature sensor are used to determine sensor errors.

Malfunction Caused

- Faulty connector connection.
- Faulty sensor.
- Faulty PCB.

Troubleshooting


When abnormality indication starts again
Check the connector connection:
Turn off the power
Check the connector connection
Caution
For safety reason and to prevent component breakdown, always switch off the power before remove and connect the component.
Is the connector connection normal?
NO
Connector poor contact
Correct the connection
YES
Check the outdoor discharge pipe temperature sensor:
Plug out connector from the outdoor unit PCB
Measure the resistance of the outdoor discharge pipe temperature sensor
Is the measured resistance of the outdoor heat exchanger temperature sensor matches the value specified in its characteristic chart?
NO
Defect in outdoor discharge pipe temperature sensor
Replace the outdoor discharge pipe temperature sensor
YES
Defect in outdoor unit PCB
Replace the outdoor unit PCB

15.4.12 H33 (Unspecified Voltage between Indoor and Outdoor)

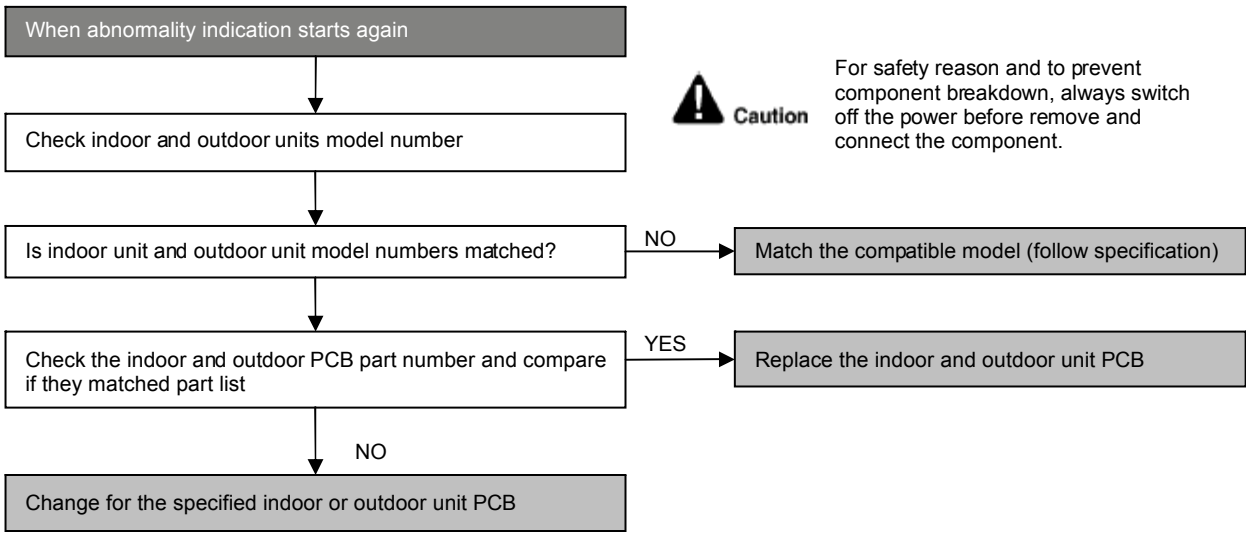
Malfunction Decision Conditions

- The supply power is detected for its requirement by the indoor/outdoor transmission.

Malfunction Caused

- Wrong models interconnected.
- Wrong indoor unit and outdoor unit PCBs used.
- Indoor unit or outdoor unit PCB defective.

Troubleshooting


When abnormality indication starts again
Check indoor and outdoor units model number
Is indoor unit and outdoor unit model numbers matched?
NO
Match the compatible model (follow specification)
Check the indoor and outdoor PCB part number and compare if they matched part list
YES
Replace the indoor and outdoor unit PCB
NO
Change for the specified indoor or outdoor unit PCB
Caution
For safety reason and to prevent component breakdown, always switch off the power before remove and connect the component.

15.4.13 H34 (Outdoor Heat Sink Temperature Sensor Abnormality)

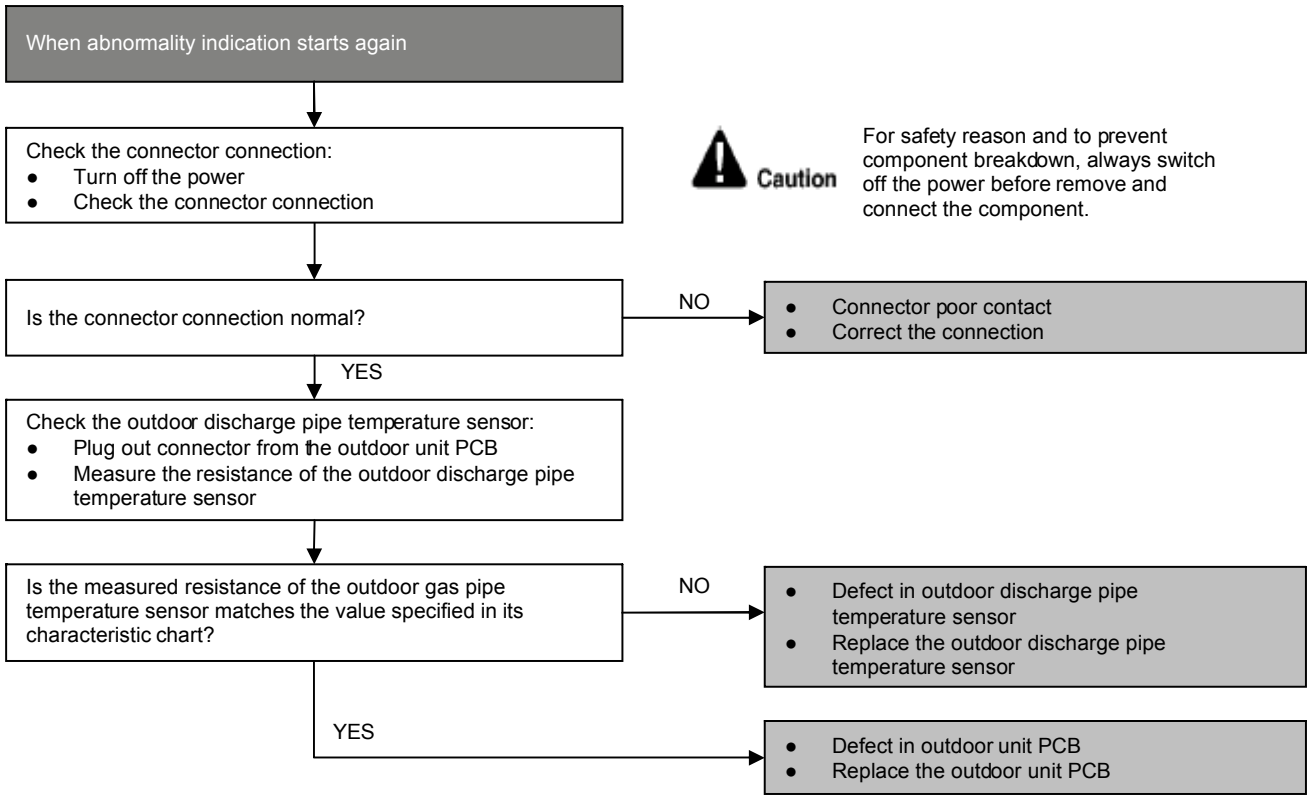
Malfunction Decision Conditions

- During startup and operation of cooling and heating, the temperatures detected by the outdoor heat sink temperature sensor are used to determine sensor errors.

Malfunction Caused

- Faulty connector connection.
- Faulty sensor.
- Faulty PCB.

Troubleshooting


When abnormality indication starts again
Check the connector connection:
Turn off the power
Check the connector connection
Caution
For safety reason and to prevent component breakdown, always switch off the power before remove and connect the component.
Is the connector connection normal?
NO
Connector poor contact
Correct the connection
YES
Check the outdoor discharge pipe temperature sensor:
Plug out connector from the outdoor unit PCB
Measure the resistance of the outdoor discharge pipe temperature sensor
Is the measured resistance of the outdoor gas pipe temperature sensor matches the value specified in its characteristic chart?
NO
Defect in outdoor discharge pipe temperature sensor
Replace the outdoor discharge pipe temperature sensor
YES
Defect in outdoor unit PCB
Replace the outdoor unit PCB

15.4.14 H36 (Outdoor Gas Pipe Sensor Abnormality)

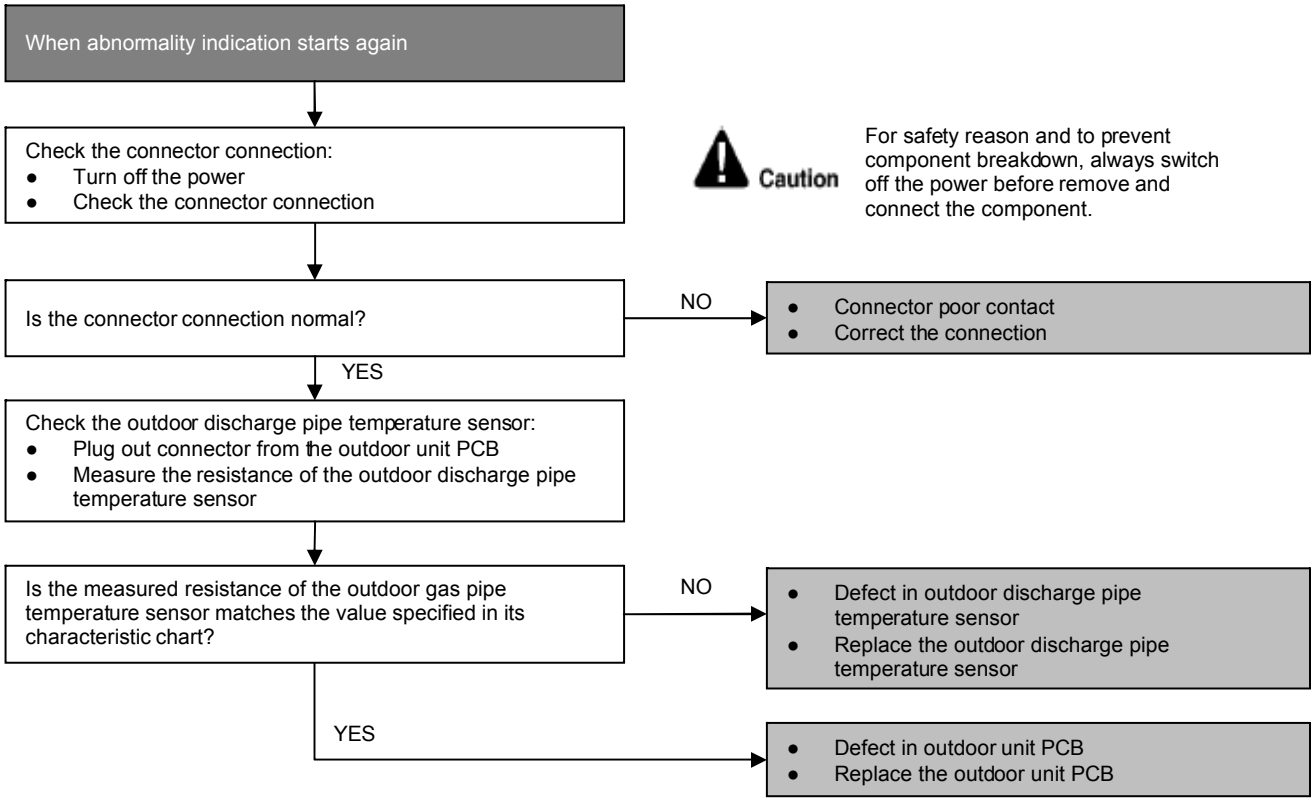
Malfunction Decision Conditions

- During startup and operation of cooling and heating, the temperatures detected by the outdoor gas pipe temperature sensor are used to determine sensor errors.

Malfunction Caused

- Faulty connector connection.
- Faulty sensor.
- Faulty PCB.

Troubleshooting


When abnormality indication starts again
Check the connector connection:
Turn off the power
Check the connector connection
Caution
For safety reason and to prevent component breakdown, always switch off the power before remove and connect the component.
Is the connector connection normal?
NO
Connector poor contact
Correct the connection
YES
Check the outdoor discharge pipe temperature sensor:
Plug out connector from the outdoor unit PCB
Measure the resistance of the outdoor discharge pipe temperature sensor
Is the measured resistance of the outdoor gas pipe temperature sensor matches the value specified in its characteristic chart?
NO
Defect in outdoor discharge pipe temperature sensor
Replace the outdoor discharge pipe temperature sensor
YES
Defect in outdoor unit PCB
Replace the outdoor unit PCB

15.4.15 H37 (Outdoor Liquid Pipe Temperature Sensor Abnormality)

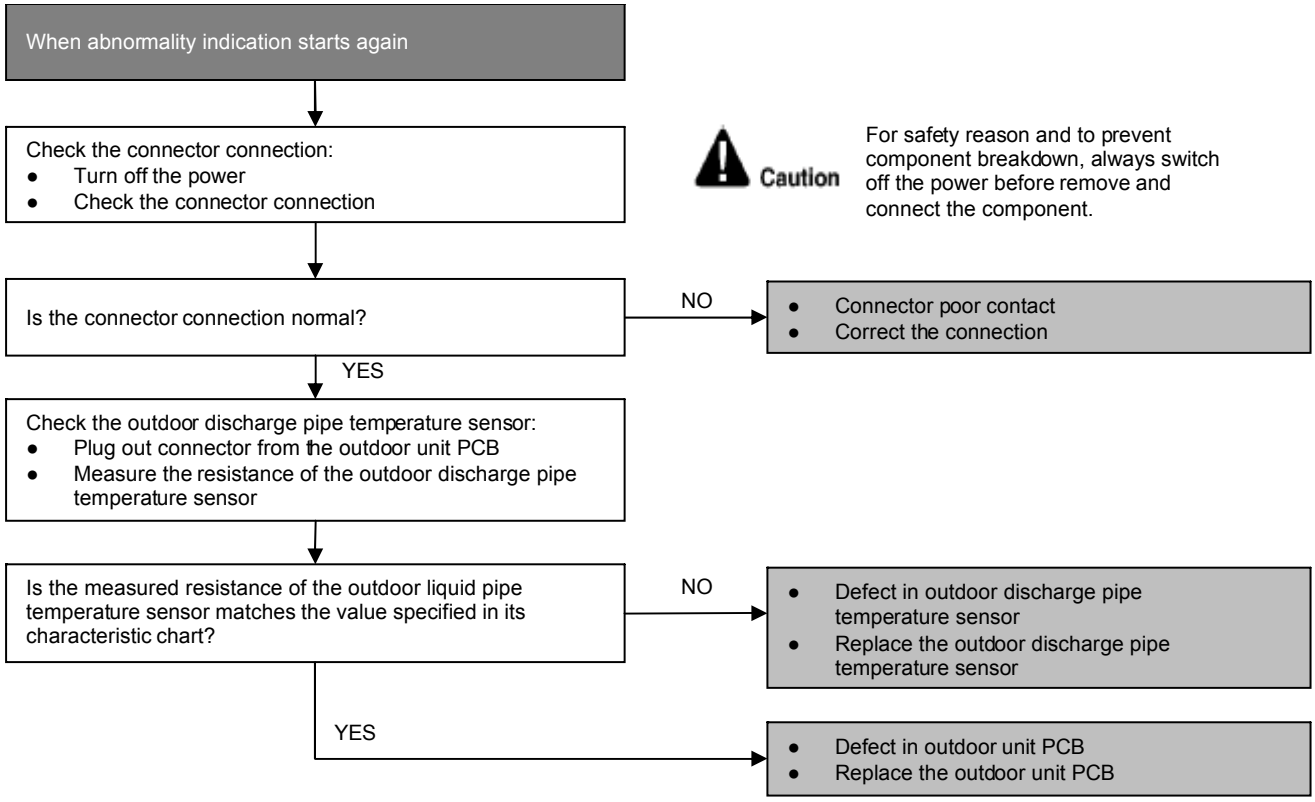
Malfunction Decision Conditions

- During startup and operation of cooling and heating, the temperatures detected by the outdoor liquid pipe temperature sensor are used to determine sensor errors.

Malfunction Caused

- Faulty connector connection.
- Faulty sensor.
- Faulty PCB.

Troubleshooting


When abnormality indication starts again
Check the connector connection:
Turn off the power
Check the connector connection
Caution
For safety reason and to prevent component breakdown, always switch off the power before remove and connect the component.
Is the connector connection normal?
NO
Connector poor contact
Correct the connection
YES
Check the outdoor discharge pipe temperature sensor:
Plug out connector from the outdoor unit PCB
Measure the resistance of the outdoor discharge pipe temperature sensor
Is the measured resistance of the outdoor liquid pipe temperature sensor matches the value specified in its characteristic chart?
NO
Defect in outdoor discharge pipe temperature sensor
Replace the outdoor discharge pipe temperature sensor
YES
Defect in outdoor unit PCB
Replace the outdoor unit PCB

15.4.16 H97 (Outdoor Fan Motor – DC Motor Mechanism Locked)

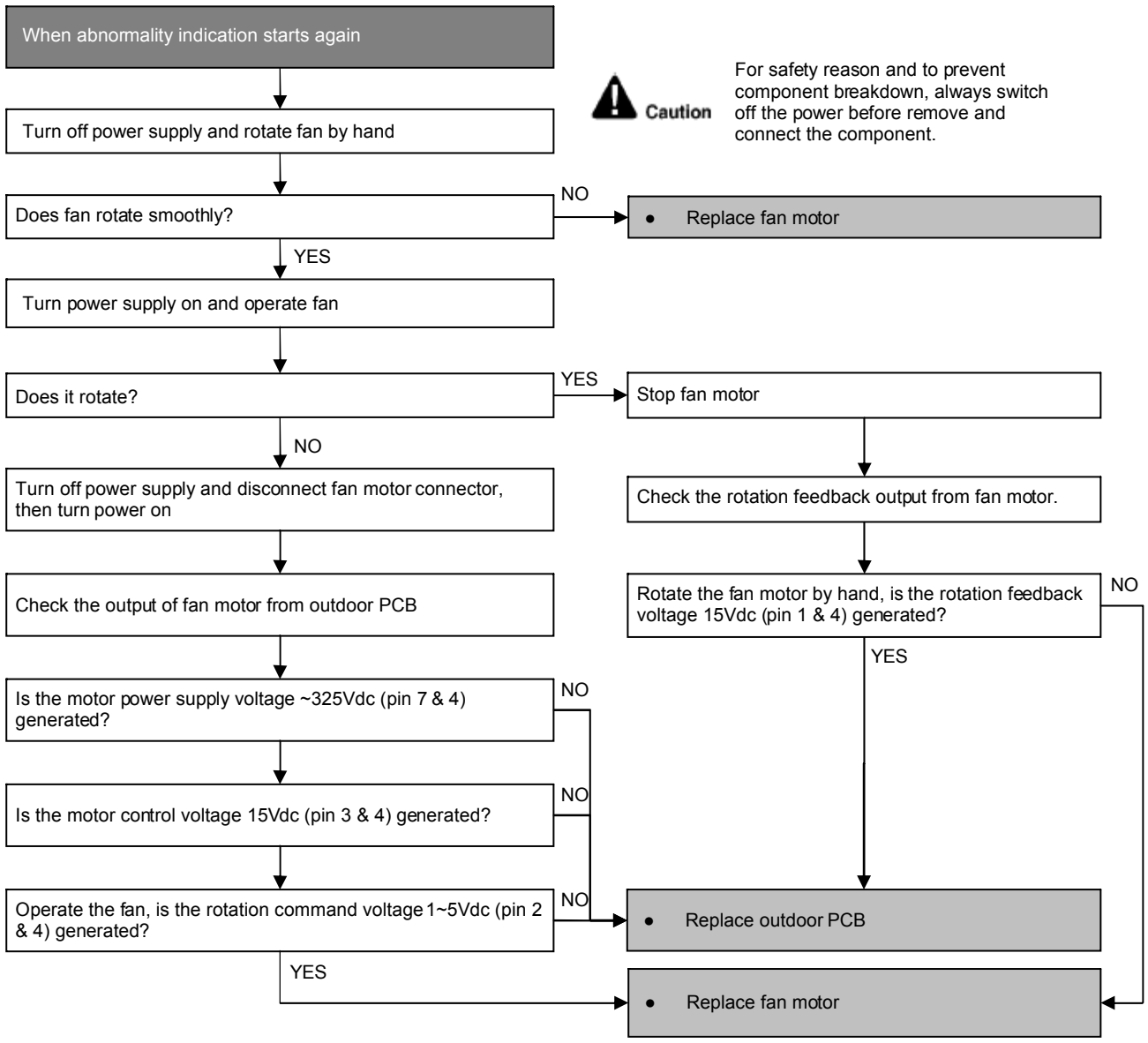
Malfunction Decision Conditions

- The rotation speed detected by the Hall IC during fan motor operation is used to determine abnormal fan motor.

Malfunction Caused

- Operation stops due to short circuit inside the fan motor winding.
- Operation stops due to breaking of wire inside the fan motor.
- Operation stops due to breaking of fan motor lead wires.
- Operation stops due to Hall IC malfunction.
- Operation error due to faulty outdoor unit PCB.

Troubleshooting


When abnormality indication starts again
Caution
For safety reason and to prevent component breakdown, always switch off the power before remove and connect the component.
Turn off power supply and rotate fan by hand
Does fan rotate smoothly?
NO
Replace fan motor
YES
Turn power supply on and operate fan
Does it rotate?
YES
Stop fan motor
NO
Turn off power supply and disconnect fan motor connector, then turn power on
Check the rotation feedback output from fan motor.
Check the output of fan motor from outdoor PCB
Rotate the fan motor by hand, is the rotation feedback voltage 15Vdc (pin 1 & 4) generated?
NO
YES
Is the motor power supply voltage ~325Vdc (pin 7 & 4) generated?
NO
Is the motor control voltage 15Vdc (pin 3 & 4) generated?
NO
Operate the fan, is the rotation command voltage 1~5Vdc (pin 2 & 4) generated?
NO
Replace outdoor PCB
YES
Replace fan motor

15.4.17 H98 (Error Code Stored in Memory and no alarm is triggered / no TIMER LED flashing)

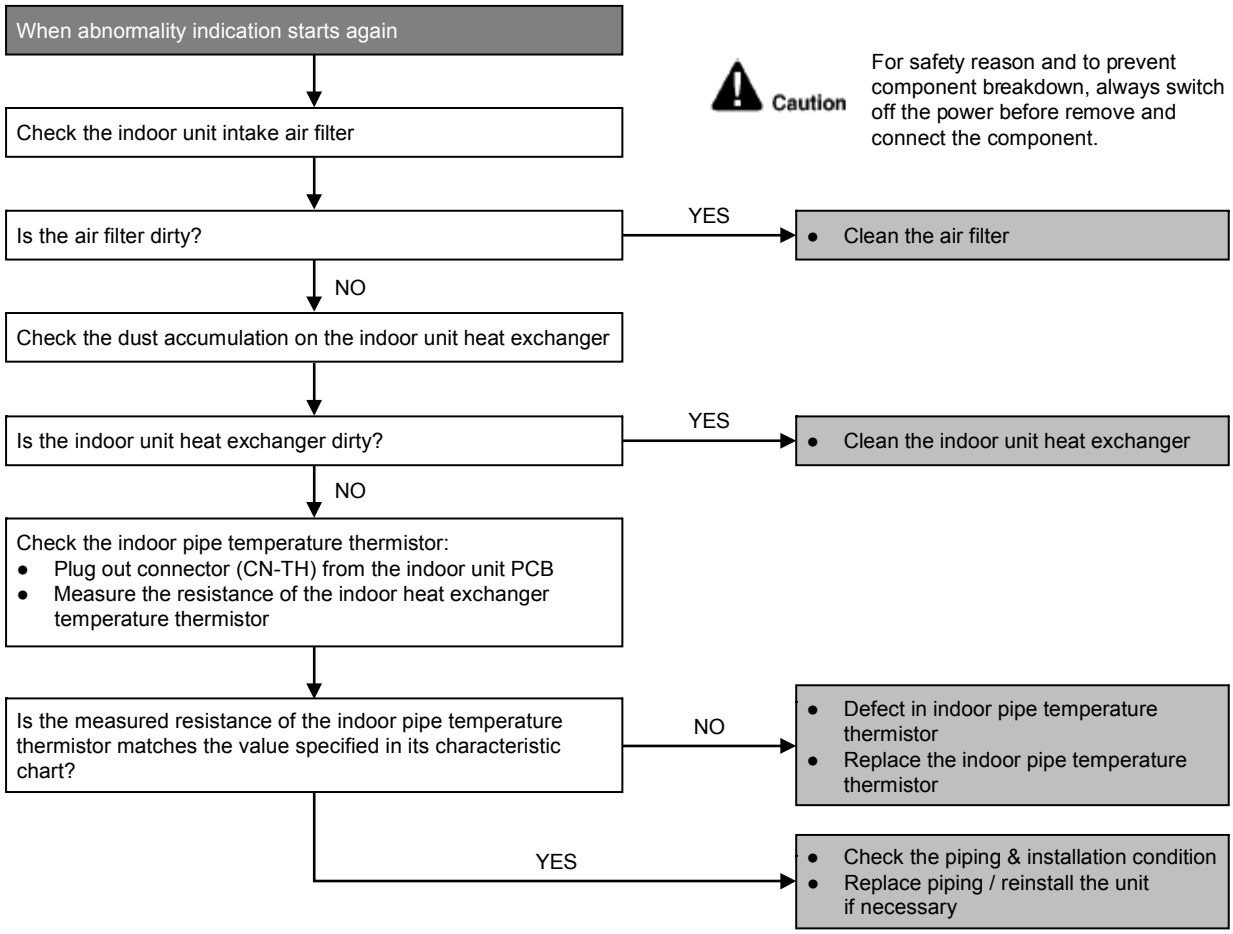
Malfunction Decision Conditions

- Indoor high pressure is detected when indoor heat exchanger is detecting very high temperature when the unit is operating in heating operation.
- Phenomena: unit is stopping and re-starting very often in heating mode

Malfunction Caused

- Indoor heat exchanger thermistor
- Clogged air filter or heat exchanger
- Over-bent pipe (liquid side)

Troubleshooting


When abnormality indication starts again
Caution
For safety reason and to prevent component breakdown, always switch off the power before remove and connect the component.
Check the indoor unit intake air filter
Is the air filter dirty?
YES
Clean the air filter
NO
Check the dust accumulation on the indoor unit heat exchanger
Is the indoor unit heat exchanger dirty?
YES
Clean the indoor unit heat exchanger
NO
Check the indoor pipe temperature thermistor:
Plug out connector (CN-TH) from the indoor unit PCB
Measure the resistance of the indoor heat exchanger temperature thermistor
Is the measured resistance of the indoor pipe temperature thermistor matches the value specified in its characteristic chart?
NO
Defect in indoor pipe temperature thermistor
Replace the indoor pipe temperature thermistor
YES
Check the piping & installation condition
Replace piping / reinstall the unit if necessary

15.4.18 H99 (Indoor Freeze Prevention Protection: Cooling or Soft Dry)

Error Code will not display (no Timer LED blinking) but store in EEPROM

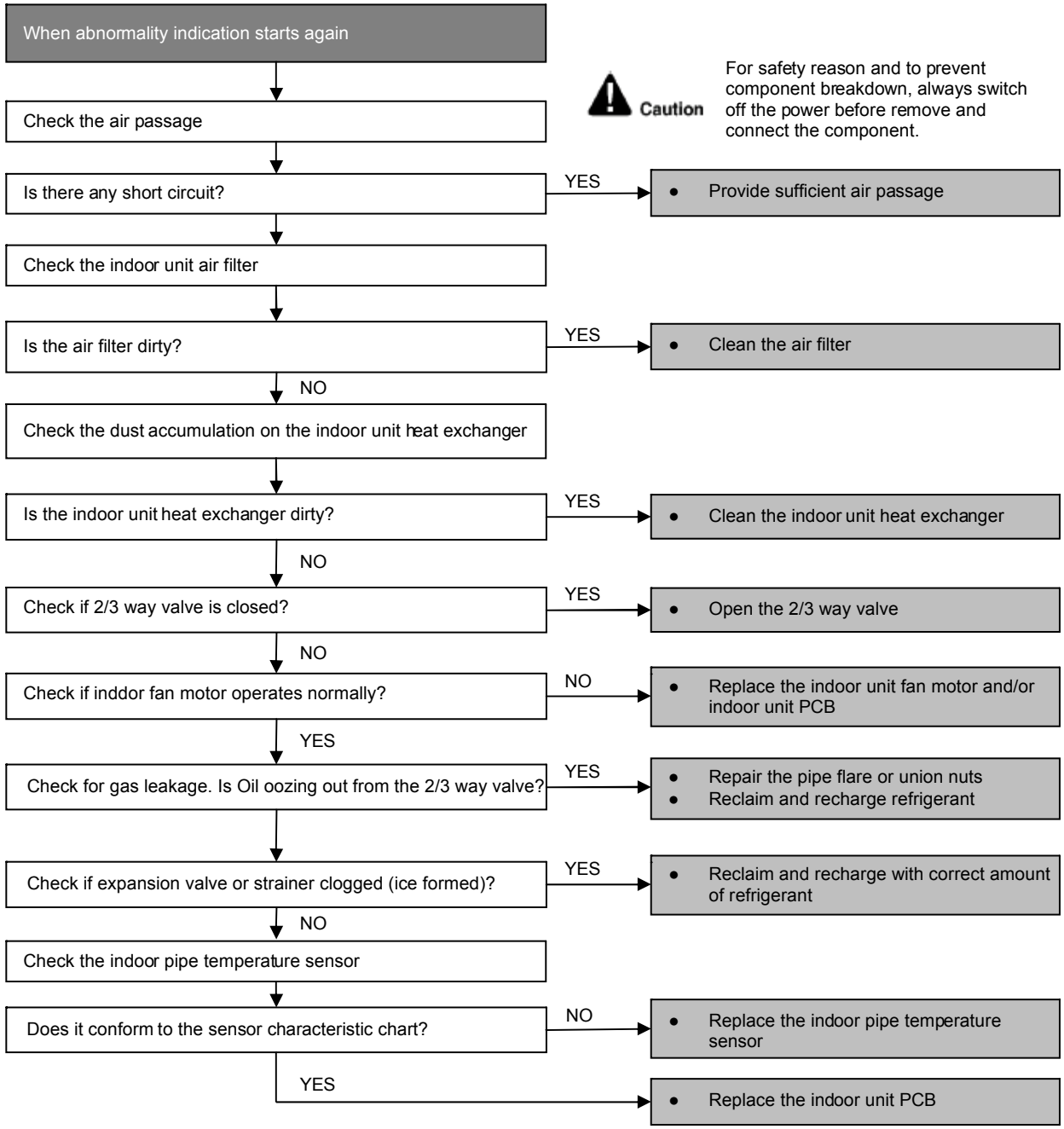
Malfunction Decision Conditions

- Freeze prevention control takes place (when indoor pipe temperature is lower than 2°C)

Malfunction Caused

- Air short circuit at indoor unit
- Clogged indoor unit air filter
- Dust accumulation on the indoor unit heat exchanger
- 2/3 way valve closed
- Faulty indoor unit fan motor
- Refrigerant shortage (refrigerant leakage)
- Clogged expansion valve or strainer
- Faulty indoor pipe temperature sensor
- Faulty indoor unit PCB

Troubleshooting


When abnormality indication starts again
Caution
For safety reason and to prevent component breakdown, always switch off the power before remove and connect the component.
Check the air passage
Is there any short circuit?
YES
• Provide sufficient air passage
Check the indoor unit air filter
Is the air filter dirty?
YES
• Clean the air filter
NO
Check the dust accumulation on the indoor unit heat exchanger
Is the indoor unit heat exchanger dirty?
YES
• Clean the indoor unit heat exchanger
NO
Check if 2/3 way valve is closed?
YES
• Open the 2/3 way valve
NO
Check if inddor fan motor operates normally?
NO
• Replace the indoor unit fan motor and/or indoor unit PCB
YES
Check for gas leakage. Is Oil oozing out from the 2/3 way valve?
YES
• Repair the pipe flare or union nuts
• Reclaim and recharge refrigerant
Check if expansion valve or strainer clogged (ice formed)?
YES
• Reclaim and recharge with correct amount of refrigerant
NO
Check the indoor pipe temperature sensor
Does it conform to the sensor characteristic chart?
NO
• Replace the indoor pipe temperature sensor
YES
• Replace the indoor unit PCB

15.4.19 F11 (4-way Valve Switching Failure)

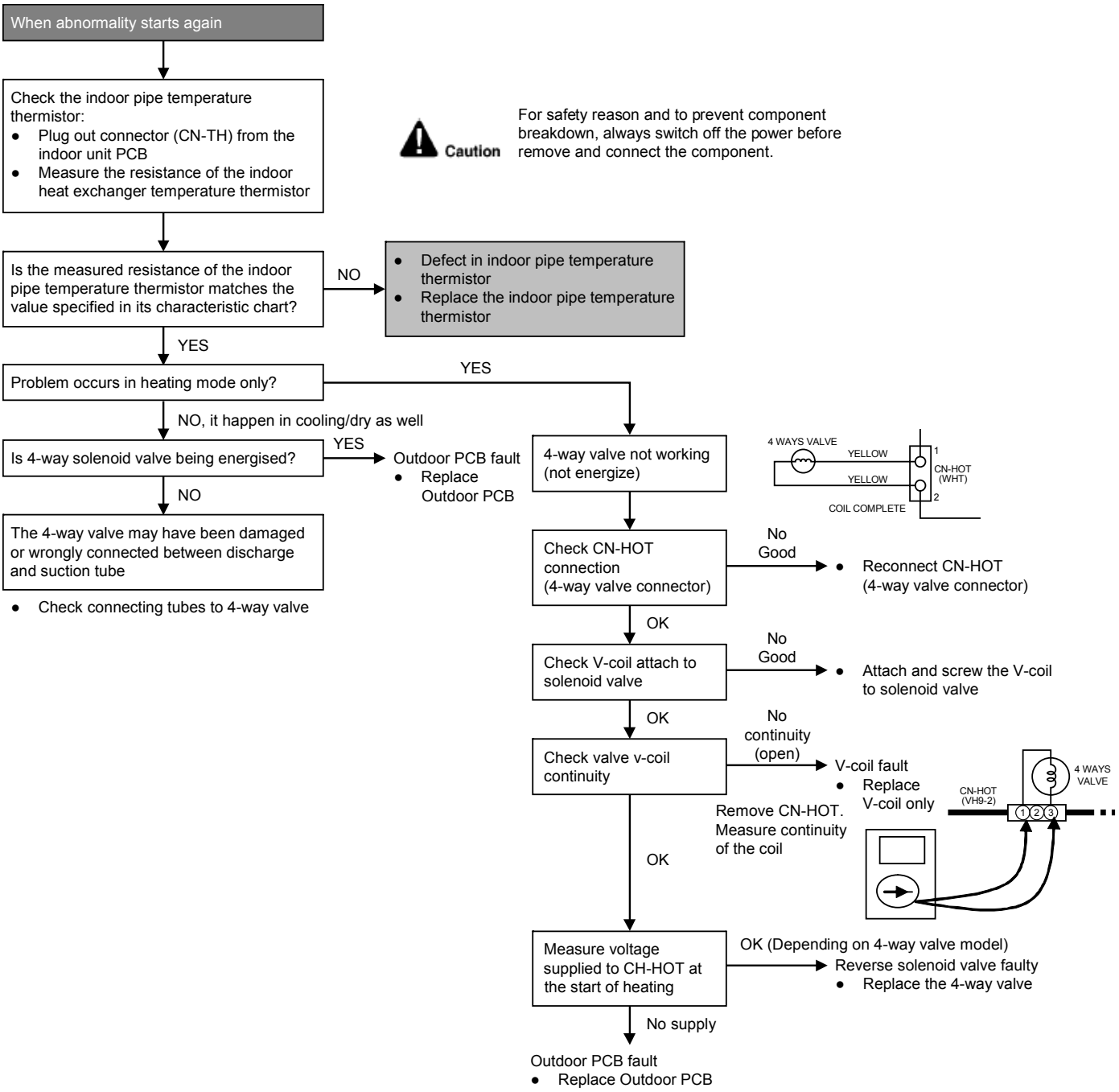
Malfunction Decision Conditions

- When indoor heat exchanger is cold during heating (except deice) or when indoor heat exchanger is hot during cooling and compressor operating, the 4-way valve is detected as malfunction.

Malfunction Caused

- Indoor heat exchanger (pipe) thermistor
- 4-way valve malfunction

Troubleshooting


When abnormality starts again
Check the indoor pipe temperature thermistor:
• Plug out connector (CN-TH) from the indoor unit PCB
• Measure the resistance of the indoor heat exchanger temperature thermistor
Caution
For safety reason and to prevent component breakdown, always switch off the power before remove and connect the component.
Is the measured resistance of the indoor pipe temperature thermistor matches the value specified in its characteristic chart?
NO
• Defect in indoor pipe temperature thermistor
• Replace the indoor pipe temperature thermistor
YES
Problem occurs in heating mode only?
YES
NO, it happen in cooling/dry as well
Is 4-way solenoid valve being energised?
YES
Outdoor PCB fault
• Replace Outdoor PCB
NO
The 4-way valve may have been damaged or wrongly connected between discharge and suction tube
• Check connecting tubes to 4-way valve
4-way valve not working (not energize)
4 WAYS VALVE
YELLOW
YELLOW
COIL COMPLETE
CN-HOT (WHT)
1
2
Check CN-HOT connection (4-way valve connector)
No Good
• Reconnect CN-HOT (4-way valve connector)
OK
Check V-coil attach to solenoid valve
No Good
• Attach and screw the V-coil to solenoid valve
OK
Check valve v-coil continuity
No continuity (open)
V-coil fault
• Replace V-coil only
Remove CN-HOT. Measure continuity of the coil
CN-HOT (VH9-2)
4 WAYS VALVE
OK
Measure voltage supplied to CH-HOT at the start of heating
OK (Depending on 4-way valve model)
Reverse solenoid valve faulty
• Replace the 4-way valve
No supply
Outdoor PCB fault
• Replace Outdoor PCB

* Check gas side pipe – for hot gas flow in cooling mode

15.4.20 F17 (Indoor Standby Units Freezing Abnormality)

Malfunction Decision Conditions

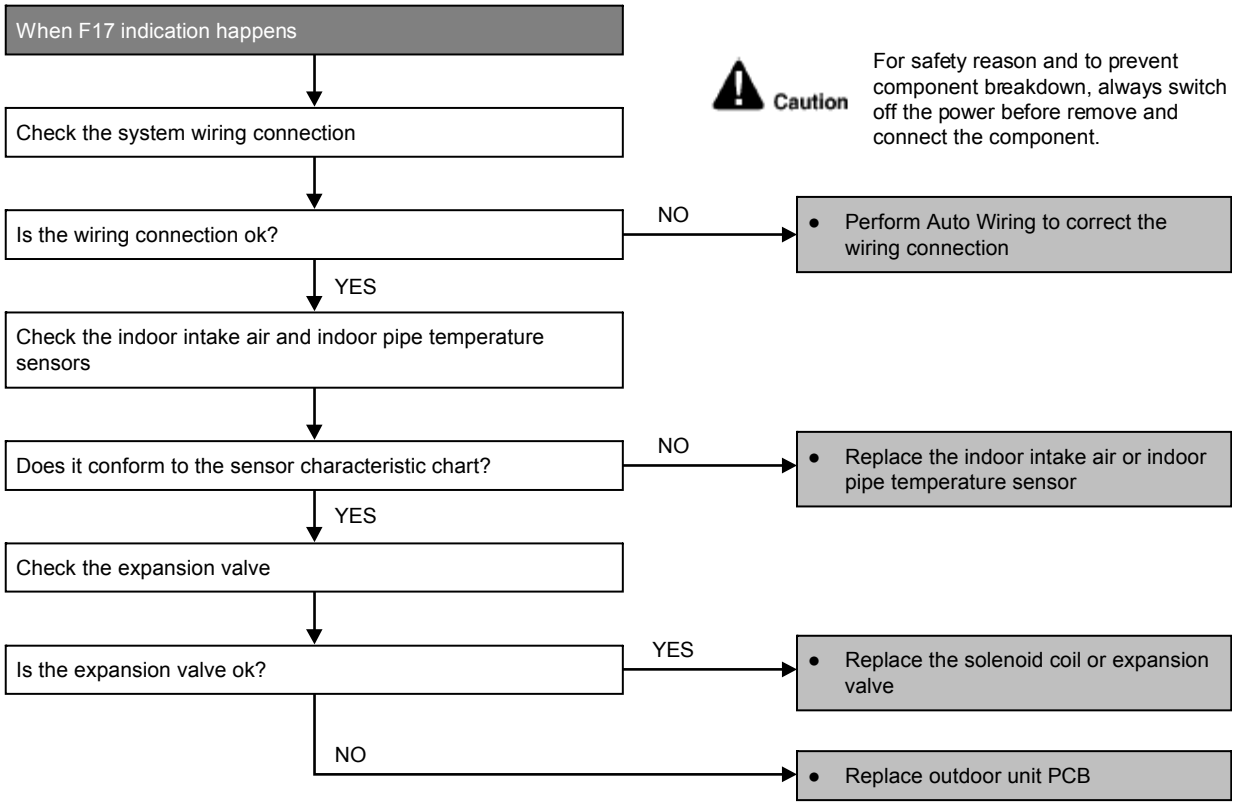
- When the different between indoor intake air temperature and indoor pipe temperature is above 10°C or indoor pipe temperature is below -1.0°C.

  Remark:
  When the indoor standby unit is freezing, the outdoor unit transfers F17 error code to the corresponding indoor unit and H39 to other indoor unit(s).

Malfunction Caused

- Wrong wiring connection
- Faulty sensor
- Faulty expansion valve

Troubleshooting


When F17 indication happens
Check the system wiring connection
Is the wiring connection ok?
NO
Perform Auto Wiring to correct the wiring connection
YES
Check the indoor intake air and indoor pipe temperature sensors
Does it conform to the sensor characteristic chart?
NO
Replace the indoor intake air or indoor pipe temperature sensor
YES
Check the expansion valve
Is the expansion valve ok?
YES
Replace the solenoid coil or expansion valve
NO
Replace outdoor unit PCB
Caution
For safety reason and to prevent component breakdown, always switch off the power before remove and connect the component.

15.4.21 F90 (Power Factor Correction Protection)

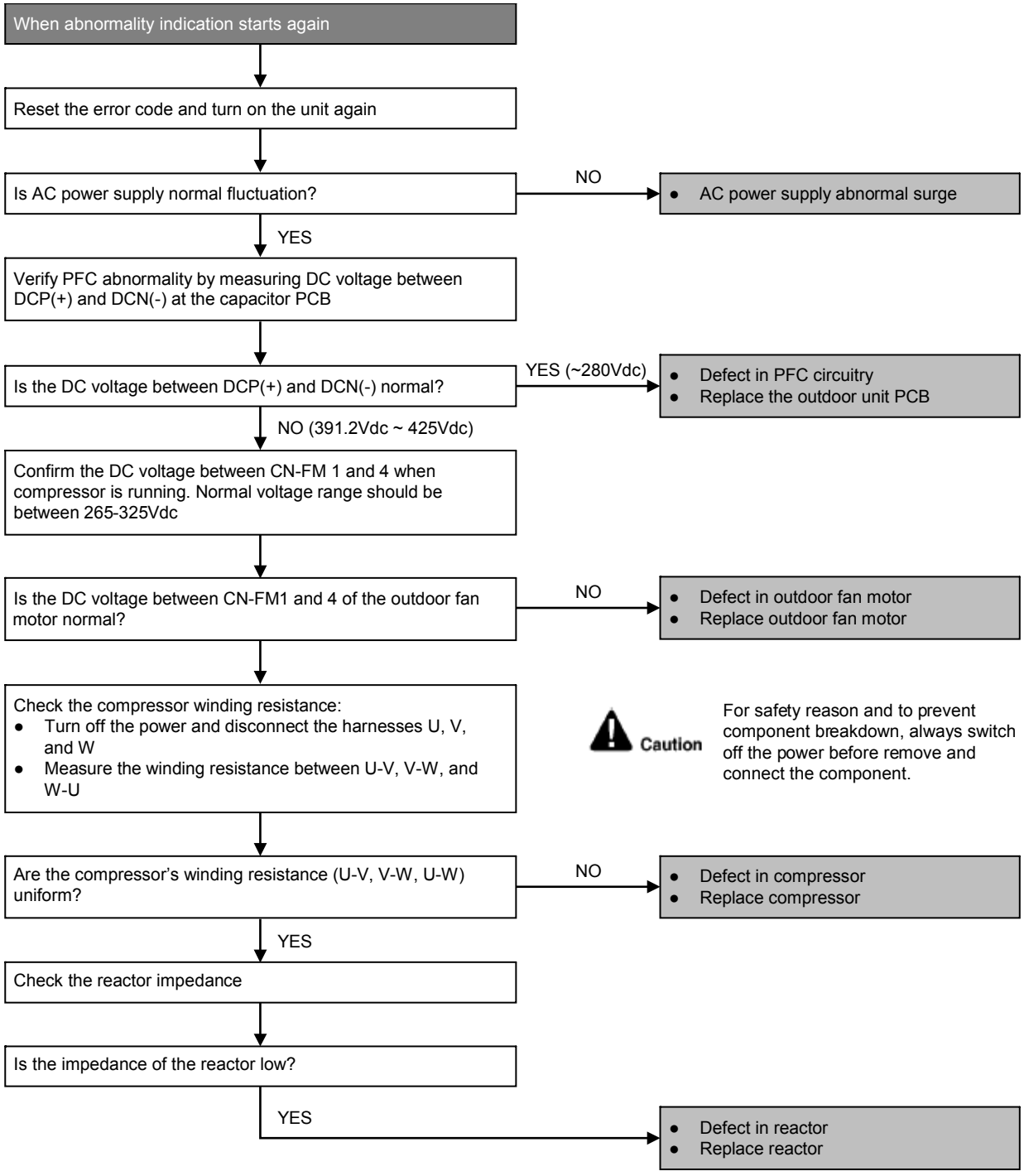
Malfunction Decision Conditions

- To maintain DC voltage level supply to power transistor.
- To detect high DC voltage level after rectification.

Malfunction Caused

- During startup and operation of cooling and heating, when Power Factor Correction (PFC) protection circuitry at the outdoor unit main PCB senses abnormal DC voltage level for power transistors.
- When DC voltage detected is LOW, transistor switching will turn ON by controller to push-up the DC level.
- When DC voltage detected is HIGH (391Vdc – 425Vdc), active LOW signal will send by the controller to turn OFF relay RY-C.

Troubleshooting


When abnormality indication starts again
Reset the error code and turn on the unit again
Is AC power supply normal fluctuation?
NO
AC power supply abnormal surge
YES
Verify PFC abnormality by measuring DC voltage between DCP(+) and DCN(-) at the capacitor PCB
Is the DC voltage between DCP(+) and DCN(-) normal?
YES (~280Vdc)
Defect in PFC circuitry
Replace the outdoor unit PCB
NO (391.2Vdc ~ 425Vdc)
Confirm the DC voltage between CN-FM 1 and 4 when compressor is running. Normal voltage range should be between 265-325Vdc
Is the DC voltage between CN-FM1 and 4 of the outdoor fan motor normal?
NO
Defect in outdoor fan motor
Replace outdoor fan motor
Check the compressor winding resistance:
Turn off the power and disconnect the harnesses U, V, and W
Measure the winding resistance between U-V, V-W, and W-U
Caution
For safety reason and to prevent component breakdown, always switch off the power before remove and connect the component.
Are the compressor's winding resistance (U-V, V-W, U-W) uniform?
NO
Defect in compressor
Replace compressor
YES
Check the reactor impedance
Is the impedance of the reactor low?
YES
Defect in reactor
Replace reactor

15.4.22 F91 (Refrigeration Cycle Abnormality)

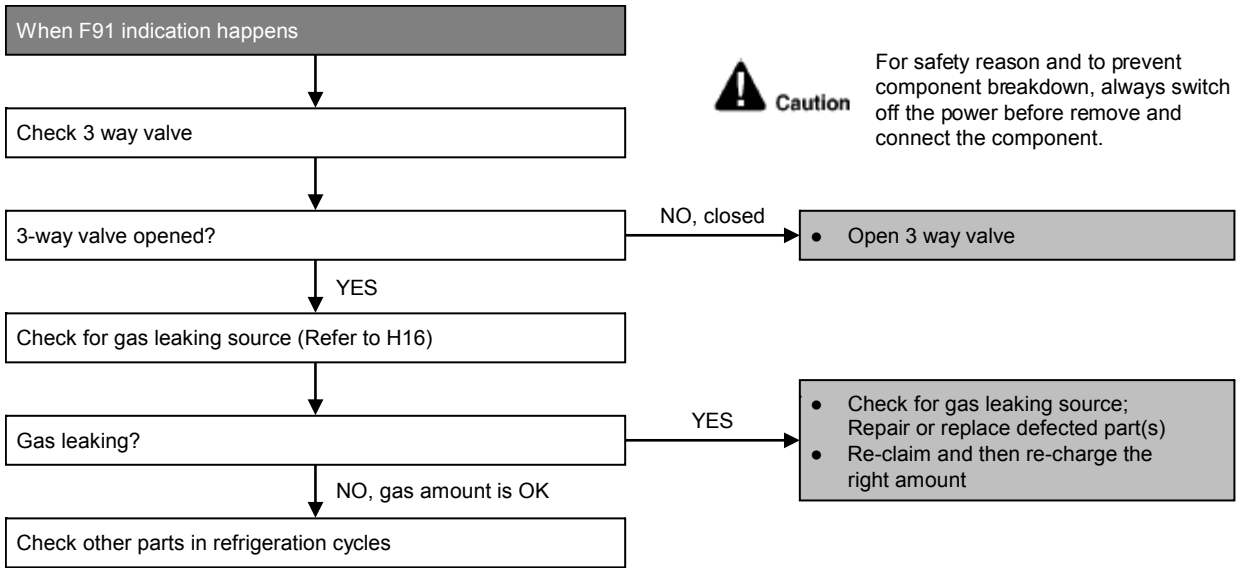
Malfunction Decision Conditions

- The input current is low while the compressor is running at higher than the setting frequency.

Malfunction Caused

- Lack of gas.
- 3-way valve close.

Troubleshooting


When F91 indication happens
Check 3 way valve
3-way valve opened?
NO, closed
Open 3 way valve
YES
Check for gas leaking source (Refer to H16)
Gas leaking?
YES
Check for gas leaking source; Repair or replace defected part(s)
Re-claim and then re-charge the right amount
NO, gas amount is OK
Check other parts in refrigeration cycles
Caution
For safety reason and to prevent component breakdown, always switch off the power before remove and connect the component.

15.4.23 F93 (Compressor Rotation Failure)

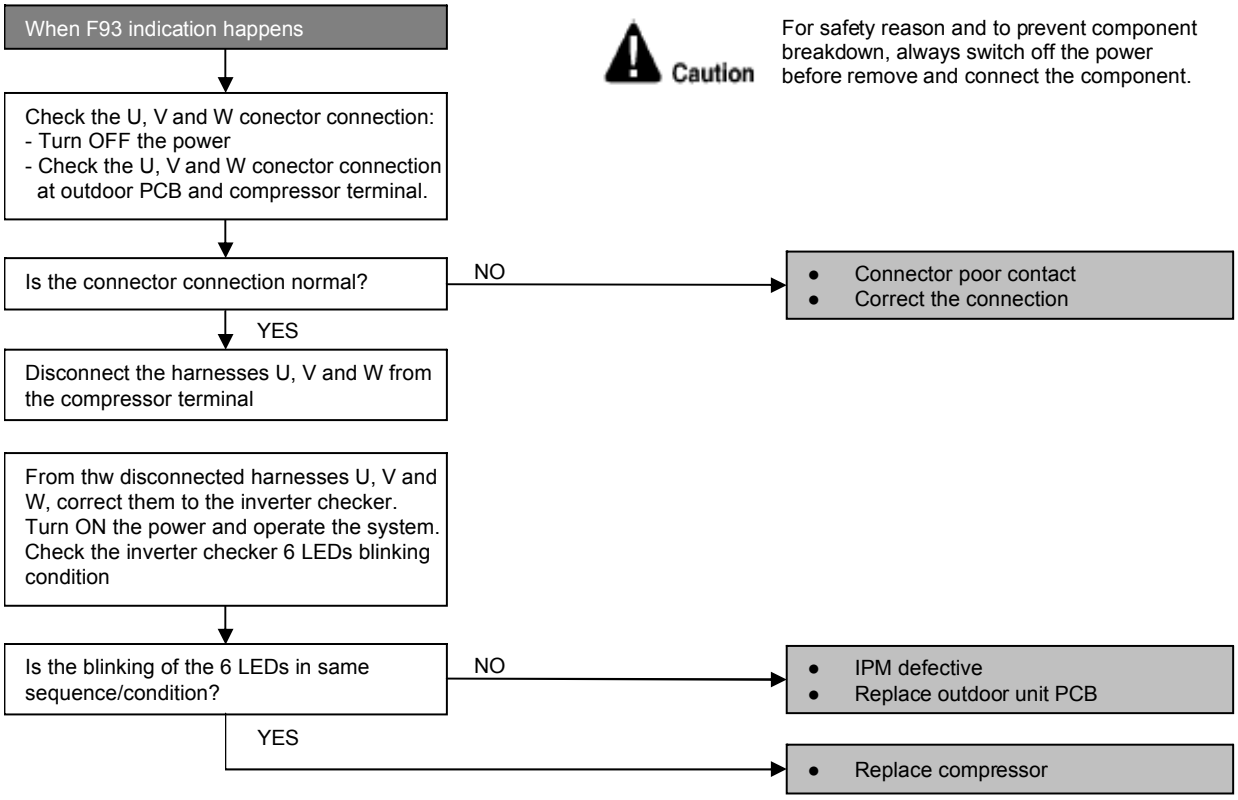
Malfunction Decision Conditions

- A compressor rotation failure is detected by checking the compressor running condition through the position detection circuit.

Malfunction Caused

- Compressor terminal disconnect
- Faulty Outdoor PCB
- Faulty compressor

Troubleshooting


When F93 indication happens
Caution
For safety reason and to prevent component breakdown, always switch off the power before remove and connect the component.
Check the U, V and W conector connection:
- Turn OFF the power
- Check the U, V and W conector connection at outdoor PCB and compressor terminal.
Is the connector connection normal?
NO
Connector poor contact
Correct the connection
YES
Disconnect the harnesses U, V and W from the compressor terminal
From thw disconnected harnesses U, V and W, correct them to the inverter checker.
Turn ON the power and operate the system.
Check the inverter checker 6 LEDs blinking condition
Is the blinking of the 6 LEDs in same sequence/condition?
NO
IPM defective
Replace outdoor unit PCB
YES
Replace compressor

15.4.24 F95 (Outdoor High Pressure Protection: Cooling or Soft Dry)

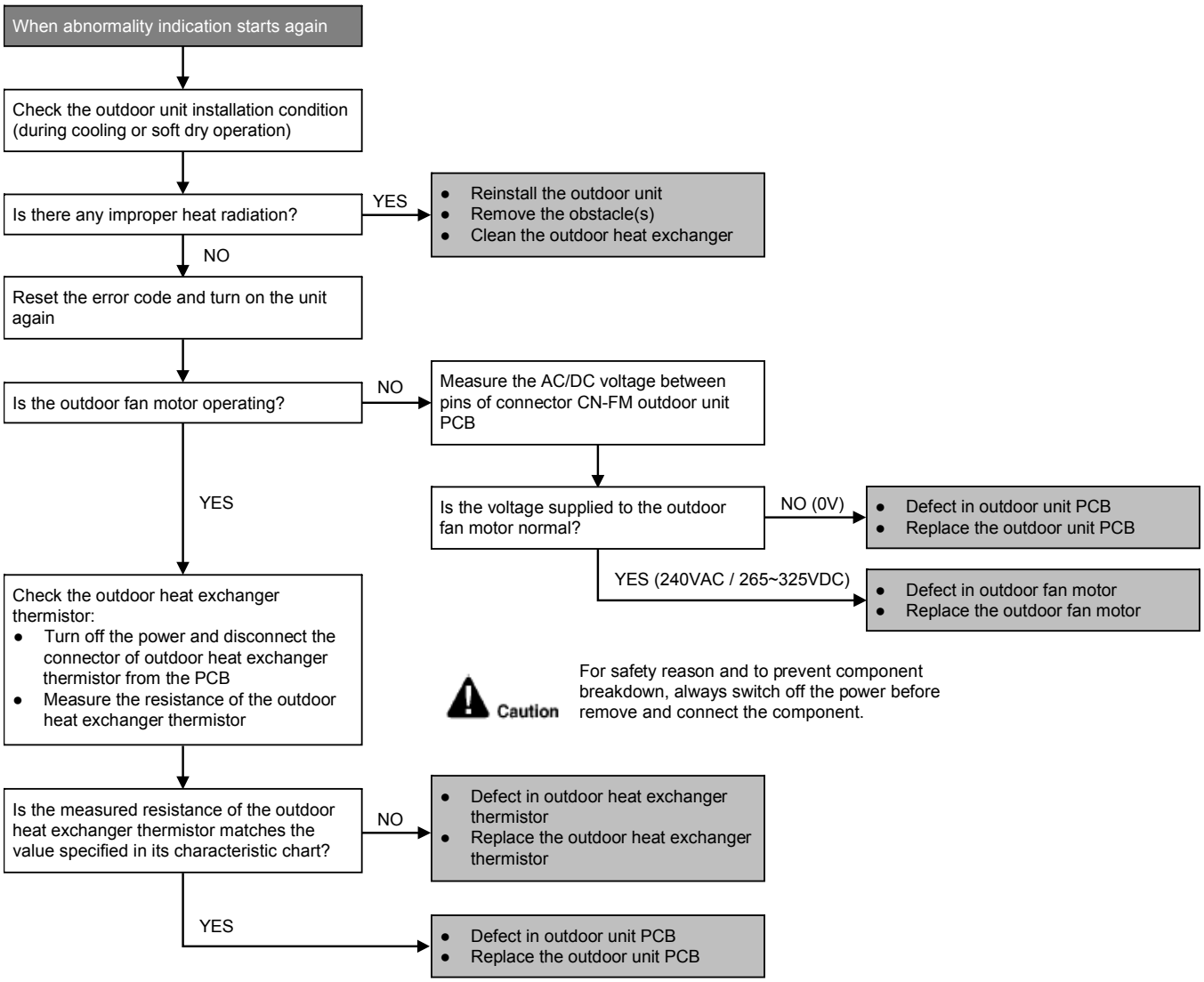
Malfunction Decision Conditions

- During operation of cooling or soft dry, when outdoor unit heat exchanger high temperature data is detected by the outdoor unit heat exchanger thermistor.

Malfunction Caused

- Outdoor heat exchanger temperature rise due to short-circuit of hot discharge air flow.
- Outdoor heat exchanger temperature rise due to defective of outdoor fan motor.
- Outdoor heat exchange temperature rise due to defective outdoor heat exchanger thermistor.
- Outdoor heat exchanger temperature rise due to defective of outdoor unit PCB.

Troubleshooting


When abnormality indication starts again
Check the outdoor unit installation condition (during cooling or soft dry operation)
Is there any improper heat radiation?
YES
Reinstall the outdoor unit
Remove the obstacle(s)
Clean the outdoor heat exchanger
NO
Reset the error code and turn on the unit again
Is the outdoor fan motor operating?
NO
Measure the AC/DC voltage between pins of connector CN-FM outdoor unit PCB
YES
Is the voltage supplied to the outdoor fan motor normal?
NO (0V)
Defect in outdoor unit PCB
Replace the outdoor unit PCB
YES (240VAC / 265~325VDC)
Defect in outdoor fan motor
Replace the outdoor fan motor
Check the outdoor heat exchanger thermistor:
Turn off the power and disconnect the connector of outdoor heat exchanger thermistor from the PCB
Measure the resistance of the outdoor heat exchanger thermistor
Caution
For safety reason and to prevent component breakdown, always switch off the power before remove and connect the component.
Is the measured resistance of the outdoor heat exchanger thermistor matches the value specified in its characteristic chart?
NO
Defect in outdoor heat exchanger thermistor
Replace the outdoor heat exchanger thermistor
YES
Defect in outdoor unit PCB
Replace the outdoor unit PCB

15.4.25 F96 (IPM Overheating)

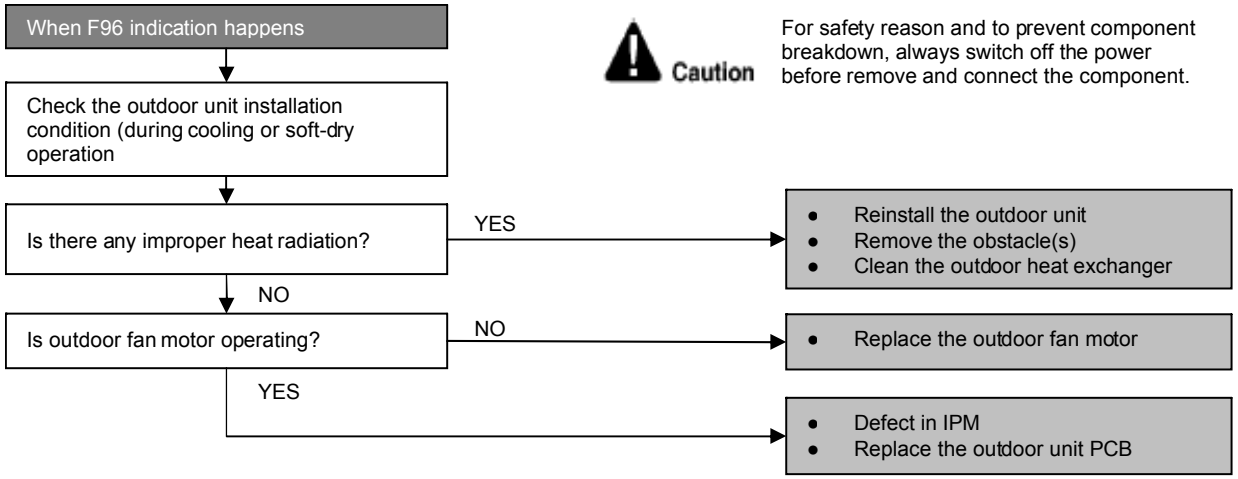
Malfunction Decision Conditions

- During operating of cooling and heating, when IPM temperature data (100°C) is detected by the IPM temperature sensor.
  Multi Models only
  - Compressor Overheating: During operation of cooling and heating, when the compressor OL is activated.
  - Heat Sink Overheating: During operation of cooling and heating, when heat sink temperature data (90°C) is detected by the heat sink temperature sensor.

Malfunction Caused

- IPM overheats due to short circuit of hot discharge air flow.
- IPM overheats due to defective of outdoor fan motor.
- IPM overheats due to defective of internal circuitry of IPM.
- IPM overheats due to defective IPM temperature sensor.
  Multi Models Only
  - Compressor OL connector poor contact.
  - Compressor OL faulty.

Troubleshooting


When F96 indication happens
Check the outdoor unit installation condition (during cooling or soft-dry operation
Is there any improper heat radiation?
YES
Reinstall the outdoor unit
Remove the obstacle(s)
Clean the outdoor heat exchanger
NO
Is outdoor fan motor operating?
NO
Replace the outdoor fan motor
YES
Defect in IPM
Replace the outdoor unit PCB
Caution
For safety reason and to prevent component breakdown, always switch off the power before remove and connect the component.

15.4.26 F97 (Compressor Overheating)

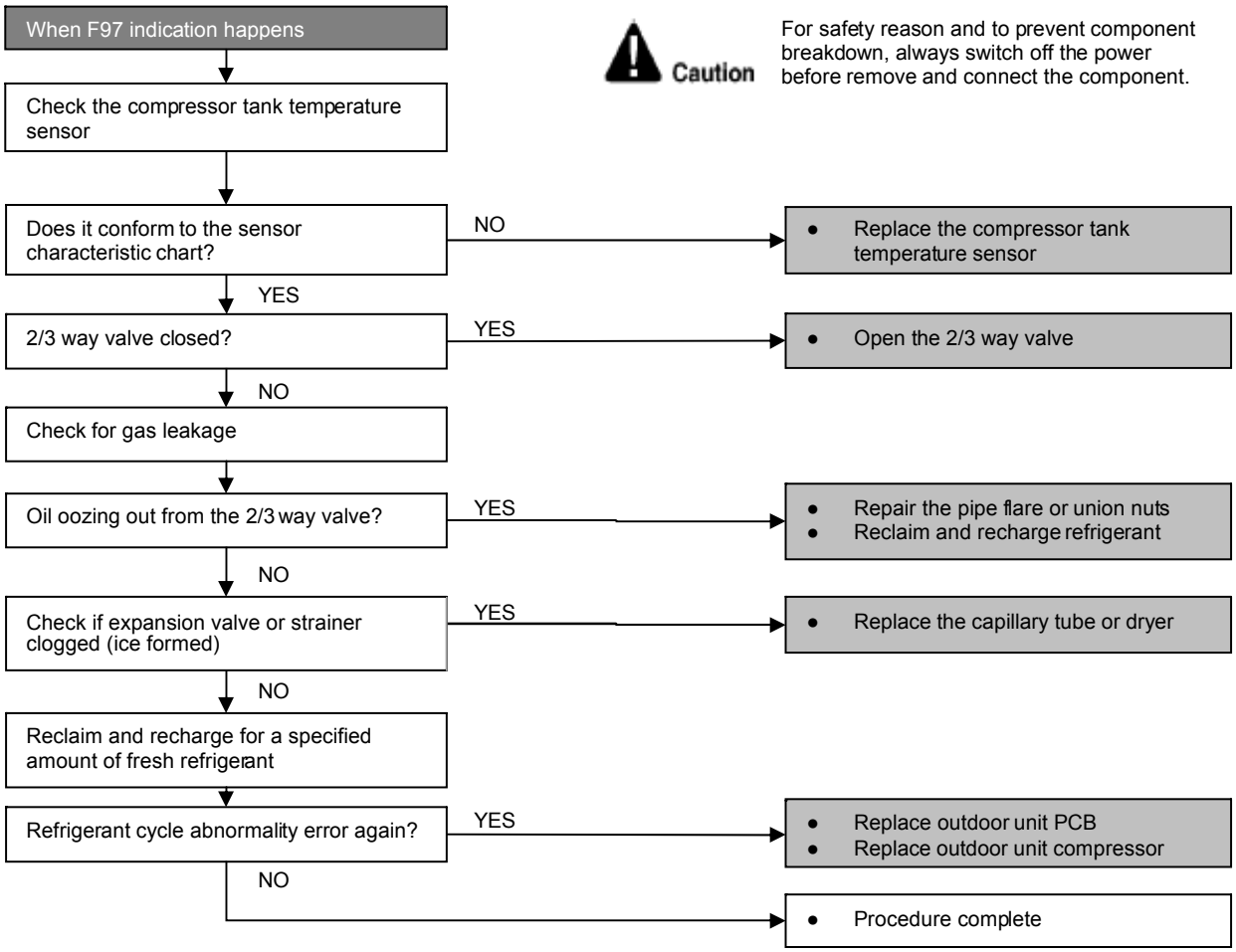
Malfunction Decision Conditions

- During operation of cooling and heating, when compressor tank temperature data (112°C) is detected by the compressor tank temperature sensor.

Malfunction Caused

- Faulty compressor tank temperature sensor
- 2/3 way valve closed
- Refrigerant shortage (refrigerant leakage)
- Faulty outdoor unit PCB
- Faulty compressor

Troubleshooting


When F97 indication happens
Check the compressor tank temperature sensor
Does it conform to the sensor characteristic chart?
NO
Replace the compressor tank temperature sensor
YES
2/3 way valve closed?
YES
Open the 2/3 way valve
NO
Check for gas leakage
Oil oozing out from the 2/3 way valve?
YES
Repair the pipe flare or union nuts
Reclaim and recharge refrigerant
NO
Check if expansion valve or strainer clogged (ice formed)
YES
Replace the capillary tube or dryer
NO
Reclaim and recharge for a specified amount of fresh refrigerant
Refrigerant cycle abnormality error again?
YES
Replace outdoor unit PCB
Replace outdoor unit compressor
NO
Procedure complete
Caution
For safety reason and to prevent component breakdown, always switch off the power before remove and connect the component.

15.4.27 F98 (Input Over Current Detection)

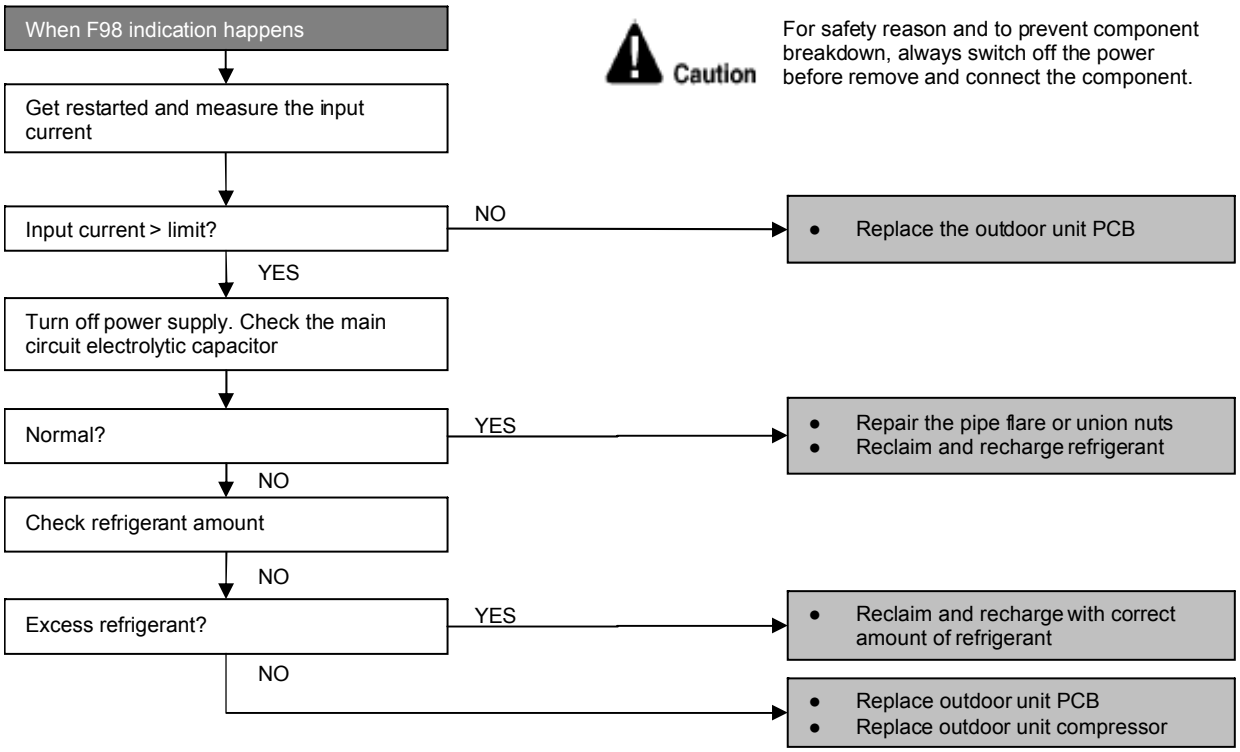
Malfunction Decision Conditions

- During operation of cooling and heating, when an input over-current (X value in Total Running Current Control) is detected by checking the input current value being detected by current transformer (CT) with the compressor running.

Malfunction Caused

- Excessive refrigerant.
- Faulty outdoor unit PCB.

Troubleshooting


When F98 indication happens
Get restarted and measure the input current
Input current > limit?
NO
Replace the outdoor unit PCB
YES
Turn off power supply. Check the main circuit electrolytic capacitor
Normal?
YES
Repair the pipe flare or union nuts
Reclaim and recharge refrigerant
NO
Check refrigerant amount
NO
Excess refrigerant?
YES
Reclaim and recharge with correct amount of refrigerant
NO
Replace outdoor unit PCB
Replace outdoor unit compressor
Caution
For safety reason and to prevent component breakdown, always switch off the power before remove and connect the component.

15.4.28 F99 (DC Peak Detection)

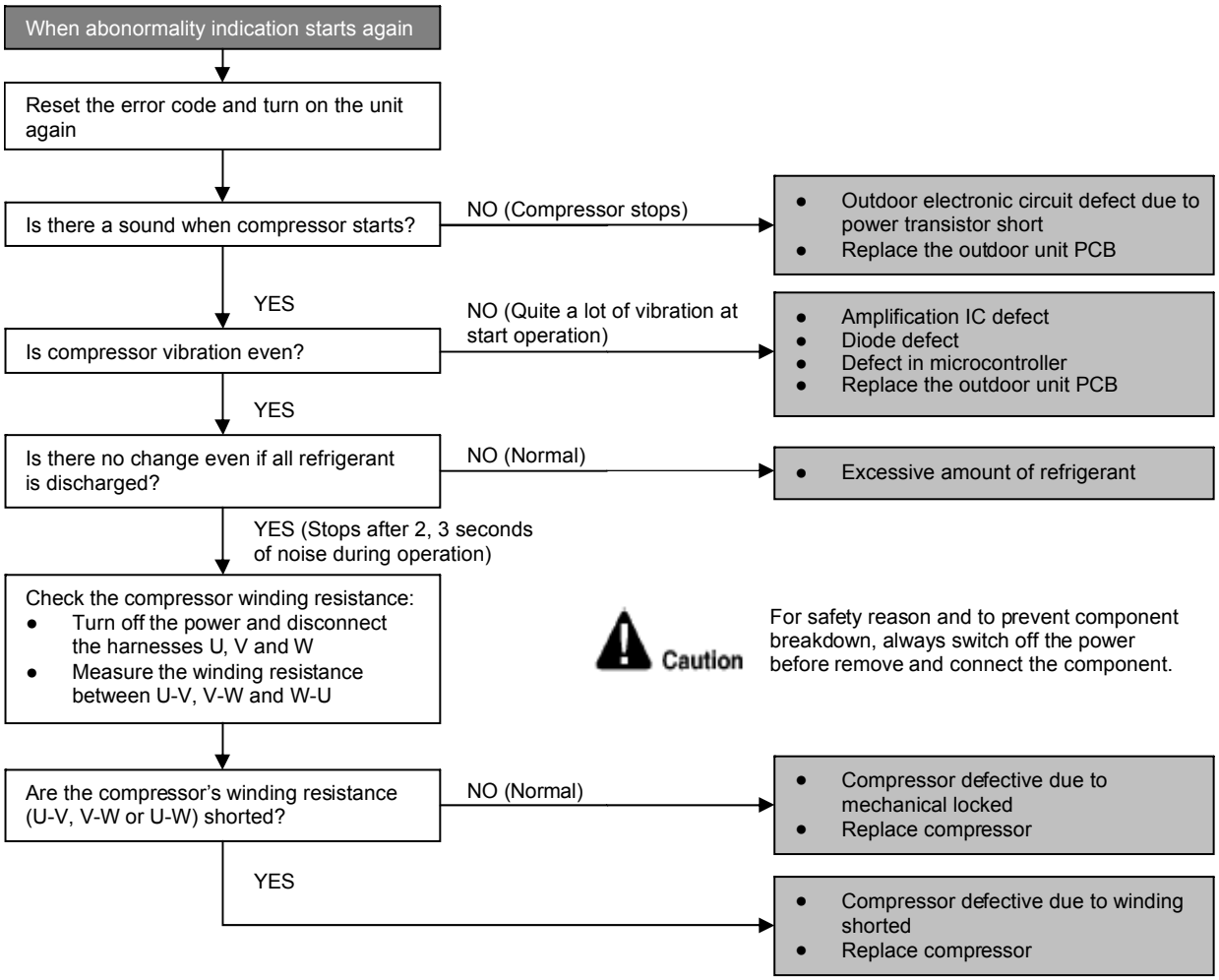
Malfunction Decision Conditions

During startup and operation of cooling and heating, when inverter DC peak data is received by the outdoor internal DC Peak sensing circuitry.

Malfunction Caused

- DC current peak due to compressor failure.
- DC current peak due to defective power transistor(s).
- DC current peak due to defective outdoor unit PCB.
- DC current peak due to short circuit.

Troubleshooting


When abonormality indication starts again
Reset the error code and turn on the unit again
Is there a sound when compressor starts?
NO (Compressor stops)
Outdoor electronic circuit defect due to power transistor short
Replace the outdoor unit PCB
YES
Is compressor vibration even?
NO (Quite a lot of vibration at start operation)
Amplification IC defect
Diode defect
Defect in microcontroller
Replace the outdoor unit PCB
YES
Is there no change even if all refrigerant is discharged?
NO (Normal)
Excessive amount of refrigerant
YES (Stops after 2, 3 seconds of noise during operation)
Check the compressor winding resistance:
Turn off the power and disconnect the harnesses U, V and W
Measure the winding resistance between U-V, V-W and W-U
Caution
For safety reason and to prevent component breakdown, always switch off the power before remove and connect the component.
Are the compressor's winding resistance (U-V, V-W or U-W) shorted?
NO (Normal)
Compressor defective due to mechanical locked
Replace compressor
YES
Compressor defective due to winding shorted
Replace compressor

16. Disassembly and Assembly Instructions

WARNING

High Voltage is generated in the electrical parts area by the capacitor. Ensure that the capacitor has discharged sufficiently before proceeding with repair work. Failure to heed this caution may result in electric shocks.

16.1 Indoor Unit

16.1.1 Indoor Electronic Controllers, Cross Flow Fan and Indoor Fan Motor Removal Procedures

16.1.1.1 To remove front grille

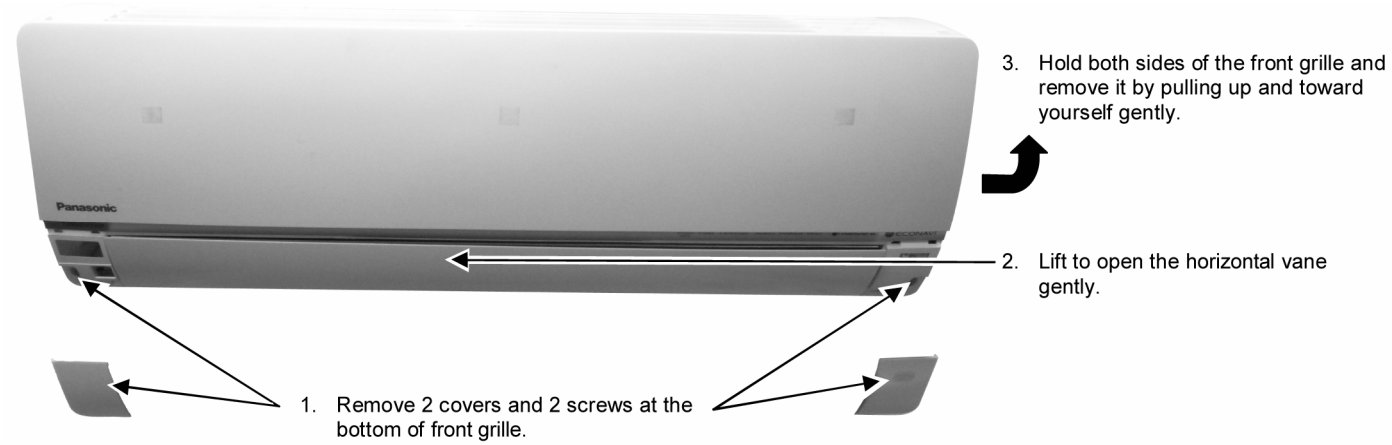

Panasonic
3. Hold both sides of the front grille and remove it by pulling up and toward yourself gently.
2. Lift to open the horizontal vane gently.
1. Remove 2 covers and 2 screws at the bottom of front grille.

Figure 1

16.1.1.2 To remove electronic controller

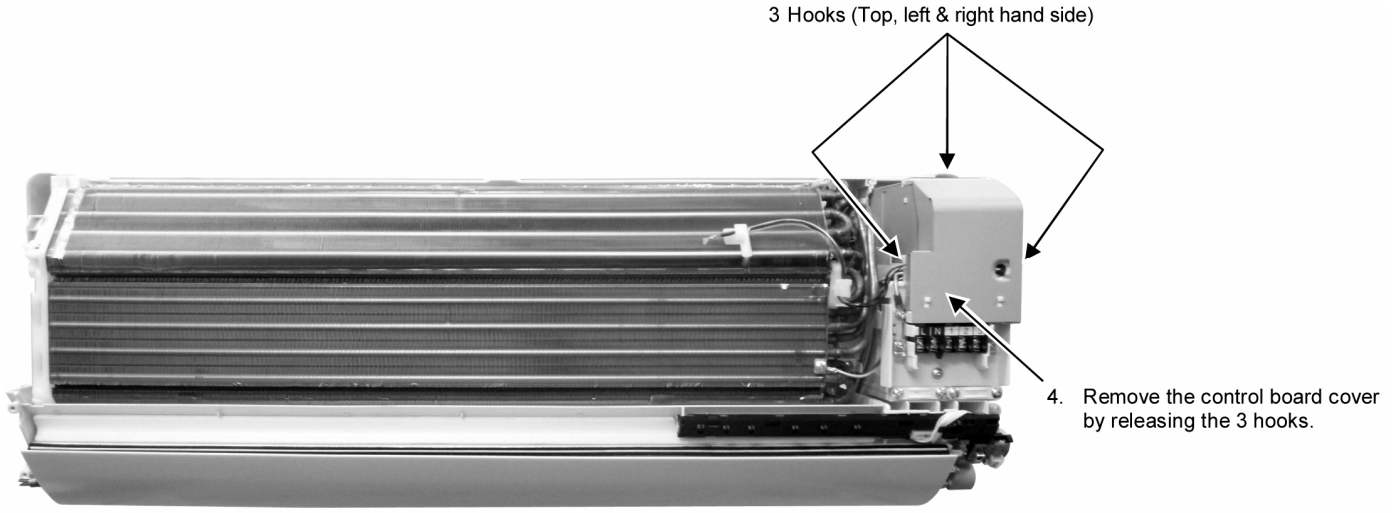


Figure 2

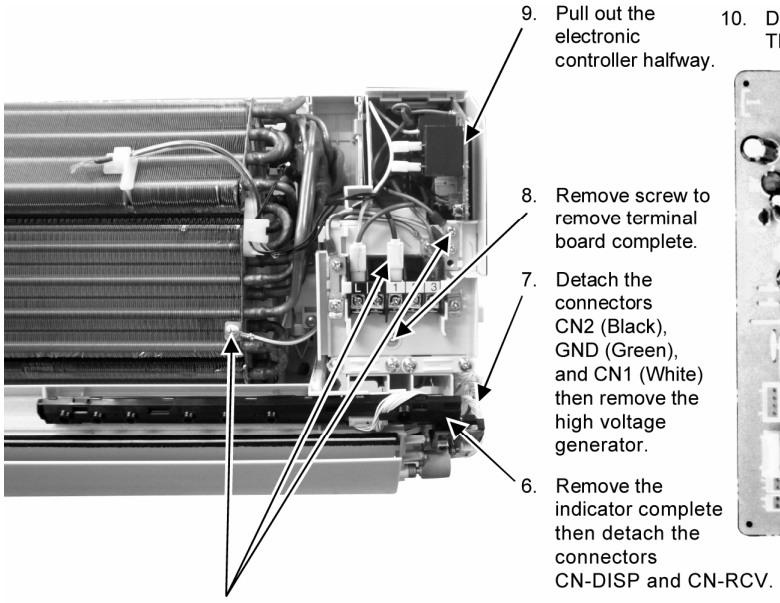

9. Pull out the electronic controller halfway.
8. Remove screw to remove terminal board complete.
7. Detach the connectors CN2 (Black), GND (Green), and CN1 (White) then remove the high voltage generator.
6. Remove the indicator complete then detach the connectors CN-DISP and CN-RCV.
5. Detach the earth wire screw, terminal wire (Brown), terminal wire (Black), terminal wire (Red) and earth wire screw (Green).

Figure 3

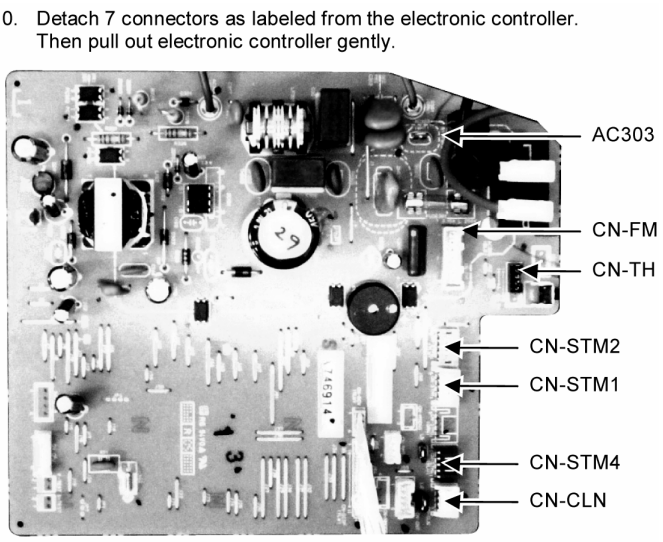


Figure 4

16.1.1.3 To remove discharge grille

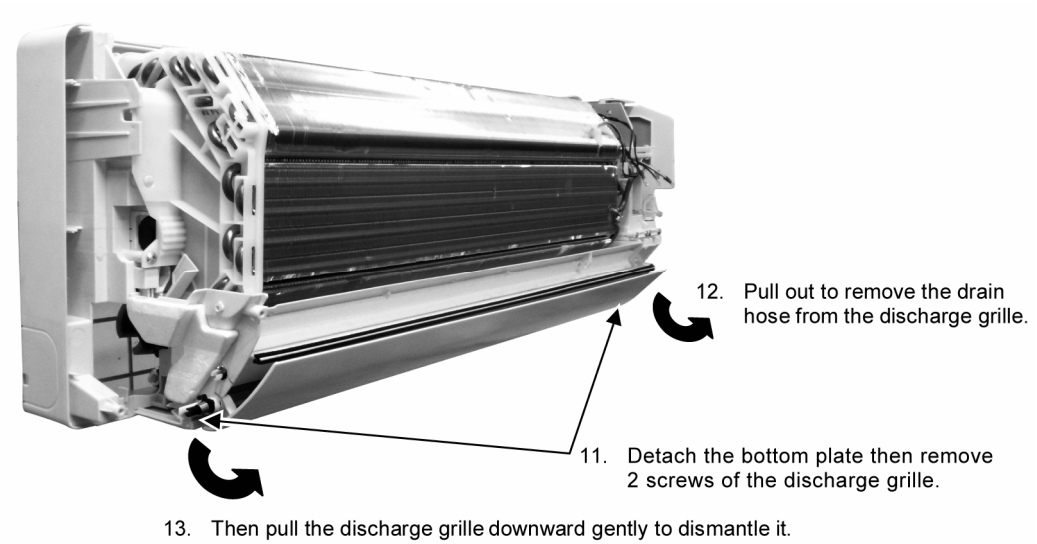
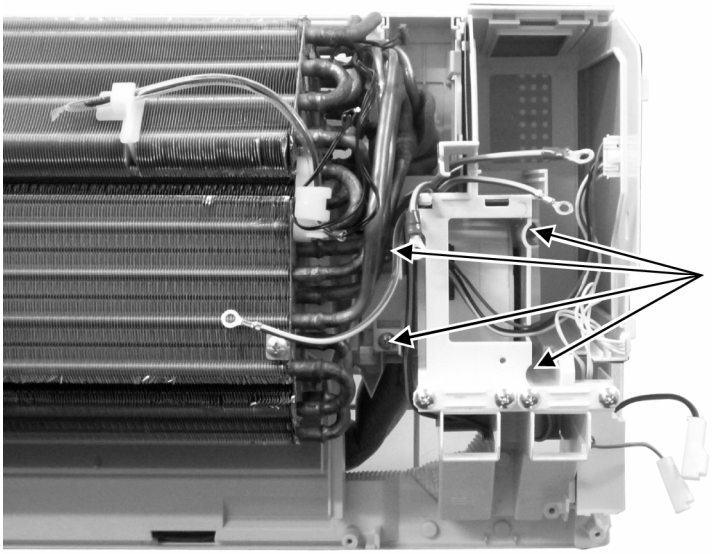

12. Pull out to remove the drain hose from the discharge grille.
11. Detach the bottom plate then remove 2 screws of the discharge grille.
13. Then pull the discharge grille downward gently to dismantle it.

Figure 5

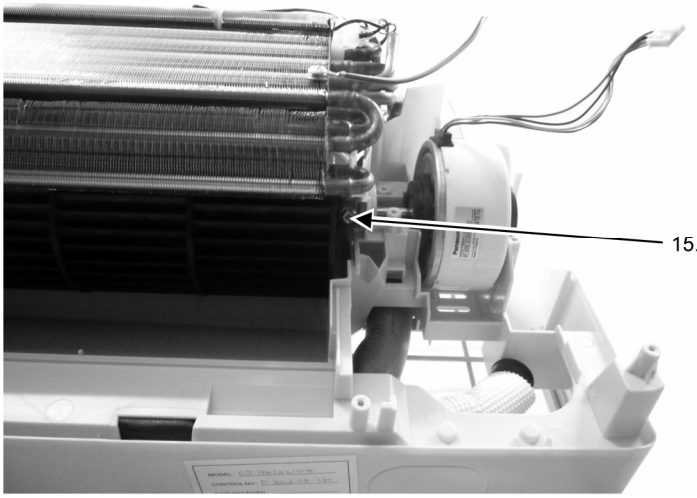
16.1.1.4 To remove control board



14. Remove the 4 screws holding the control board then pull out the control board.

Figure 6

16.1.1.5 To remove cross flow fan and indoor fan motor



15. Remove the screw that holding the cross flow fan and fan motor axis.

Figure 7

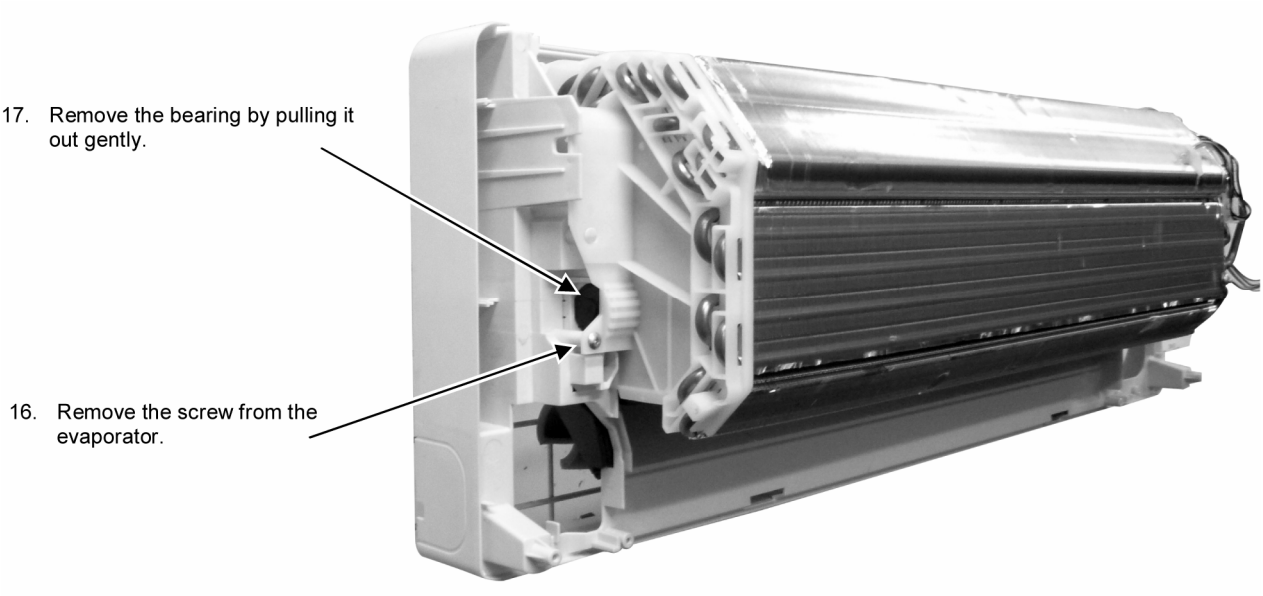


Figure 8

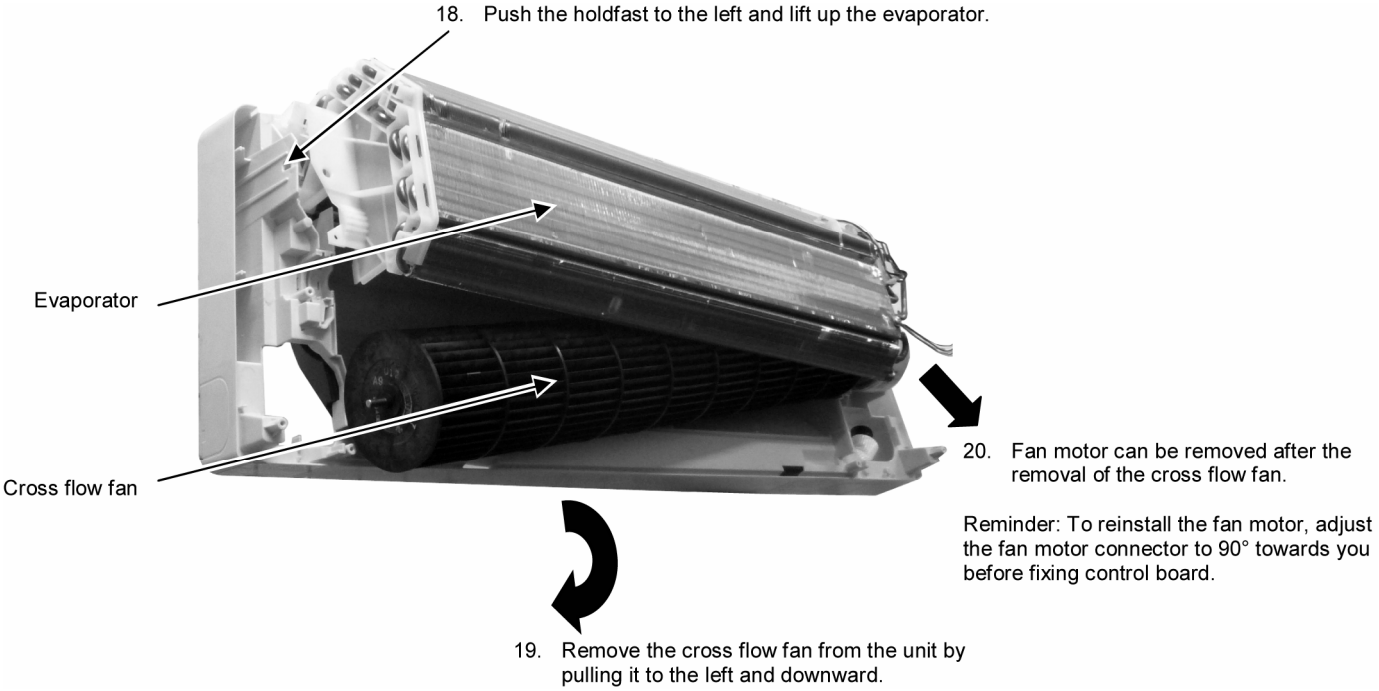

18. Push the holdfast to the left and lift up the evaporator.
Evaporator
Cross flow fan
20. Fan motor can be removed after the removal of the cross flow fan.
Reminder: To reinstall the fan motor, adjust the fan motor connector to 90° towards you before fixing control board.
19. Remove the cross flow fan from the unit by pulling it to the left and downward.

Figure 9

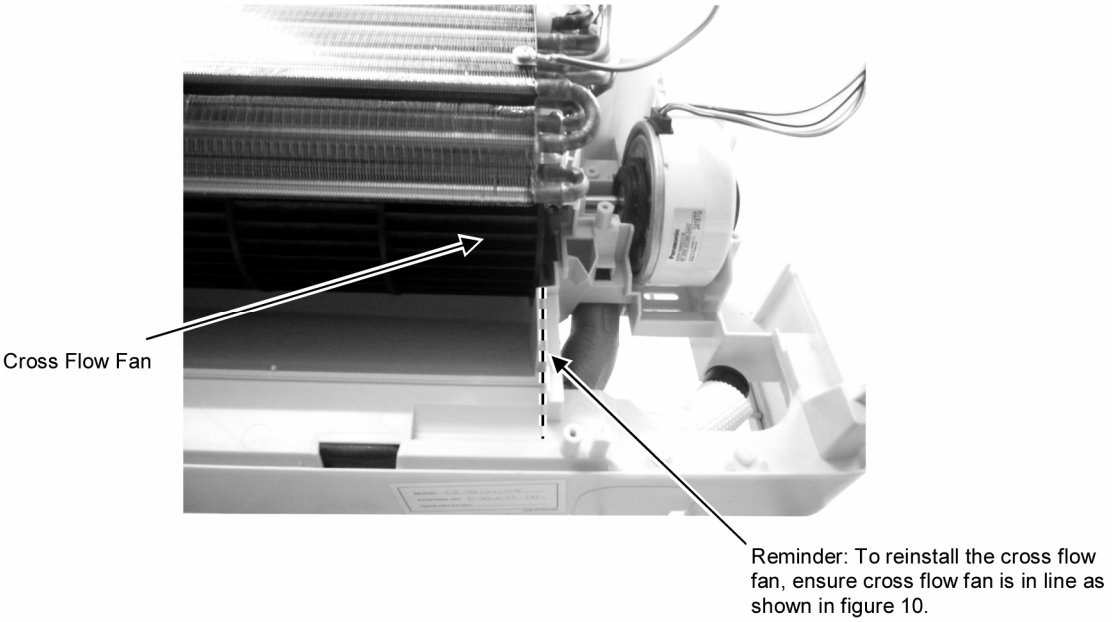

Cross Flow Fan
Reminder: To reinstall the cross flow fan, ensure cross flow fan is in line as shown in figure 10.

Figure 10

16.2 Outdoor Electronic Controller Removal Procedure

⚠ Caution! When handling electronic controller, be careful of electrostatic discharge.

1. Remove the 5 screws of the Top Panel.

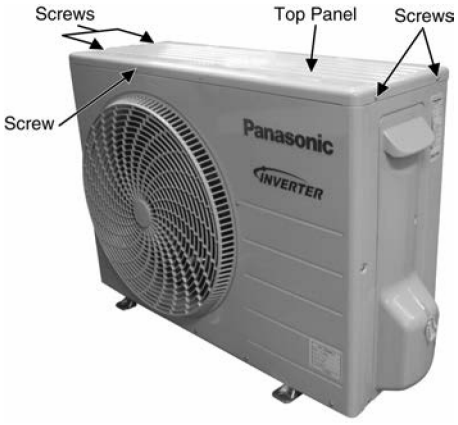


Fig. 1

2. Remove the 8 screws of the Front Panel.

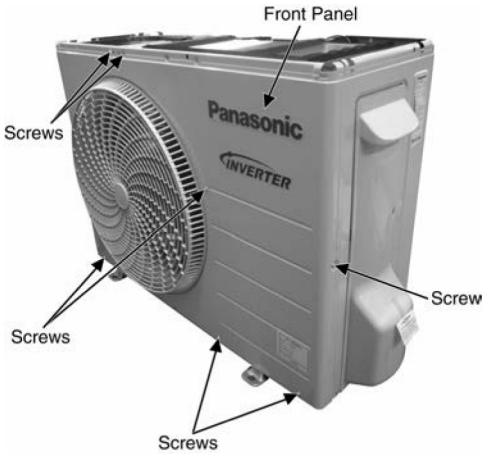


Fig. 2

3. Remove the screw of the Terminal Board Cover.
4. Remove the Top Cover of the Control Board by 4 hooks.

Fig. 3

5. Remove the Control Board as follows:

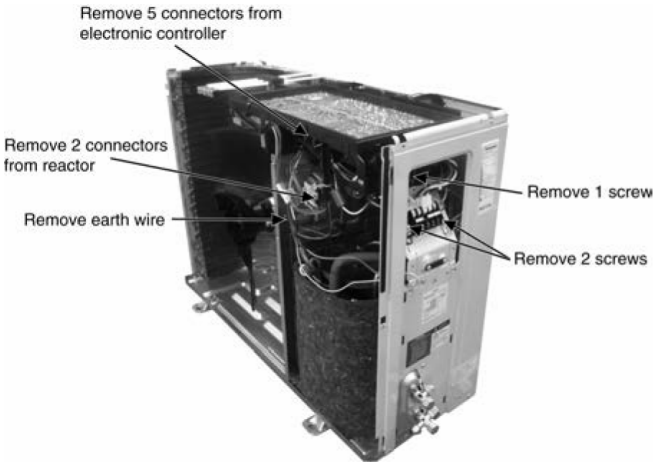

Remove 5 connectors from electronic controller
Remove 2 connectors from reactor
Remove 1 screw
Remove earth wire
Remove 2 screws

Fig. 4

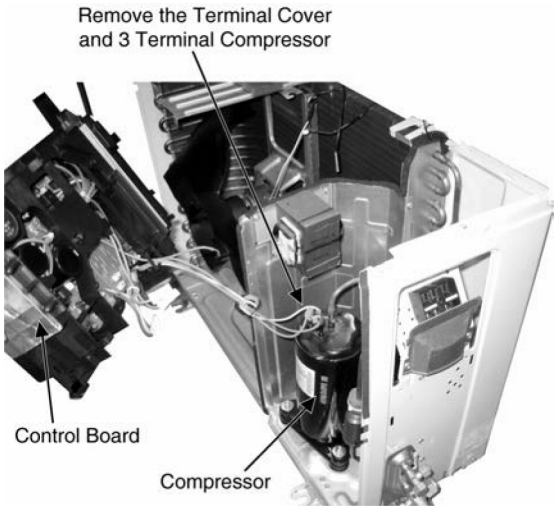


Fig. 5

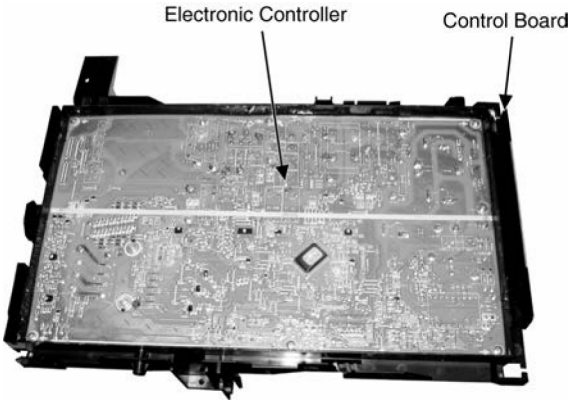


Fig. 6

17. Technical Data

Technical data provided are based on the air conditioner running under free frequency.

17.1 Cool Mode Performance Data

Unit setting: Standard piping length, Hi Fan, Cool mode at 16°C
Voltage: 230V

17.1.1 CS-HE9PKE / CU-HE9PKE CS-AE9PKE / CU-AE9PKE

Indoor (°C)		Outdoor DB (°C)								
DB	WB	16			25			35		
		TC	SHC	IP	TC	SHC	IP	TC	SHC	IP
27	19.0	3293	2565	275	2871	2351	355	2500	2240	455
	22.0	3531	1974	266	3130	2163	357	2900	1792	458
23	15.7	3017	2516	282	2546	2307	355	2455	2266	454
	18.4	3145	1931	277	2870	1702	356	2527	1701	450
20	13.3	2747	2417	285	2422	2180	360	2143	2029	446
	15.8	2879	1869	281	2573	1729	358	2240	1651	454

(Dry bulb value based on 46% humidity)

17.1.2 CS-HE12PKE / CU-HE12PKE

Indoor (°C)		Outdoor DB (°C)								
DB	WB	16			25			35		
		TC	SHC	IP	TC	SHC	IP	TC	SHC	IP
27	19.0	4610	3591	502	4020	3292	647	3500	3135	830
	22.0	4943	2763	485	4382	3028	651	4060	2509	835
23	15.7	4224	3522	514	3565	3229	647	3437	3172	828
	18.4	4404	2704	505	4019	2383	650	3537	2381	822
20	13.3	3845	3384	521	3391	3052	657	3000	2841	814
	15.8	4030	2616	513	3602	2420	654	3136	2311	828

(Dry bulb value based on 46% humidity)

17.2 Heat Mode Performance Data

Unit setting: Standard piping length, Hi Fan, Heat mode at 30°C
Voltage: 230V

17.2.1 CS-HE9PKE / CU-HE9PKE CS-AE9PKE / CU-AE9PKE

Indoor (°C)	Outdoor WB (°C)									
DB	-15/-16		-7/-8		2/1		7/6		12/11	
	TC	IP	TC	IP	TC	IP	TC	IP	TC	IP
24	3481	1687	3915	1546	4631	1568	3158	614	3596	644
20	3530	1604	3970	1470	4750	1510	3200	575	3738	598
16	3636	1521	4089	1394	4787	1428	3443	576	3992	597

17.2.2 CS-HE12PKE / CU-HE12PKE

Indoor (°C)	Outdoor WB (°C)									
DB	-15/-16		-7/-8		2/1		7/6		12/11	
	TC	IP	TC	IP	TC	IP	TC	IP	TC	IP
24	3816	1767	4585	2020	5479	2098	4145	902	4720	946
20	3870	1680	4650	1920	5620	2020	4200	845	4906	879
16	3986	1593	4789	1821	5664	1910	4519	847	5239	877

TC - Total Cooling Capacity (kW)
SHC - Sensible Heat Capacity (kW)
IP - Input Power (kW)

18. Service Data

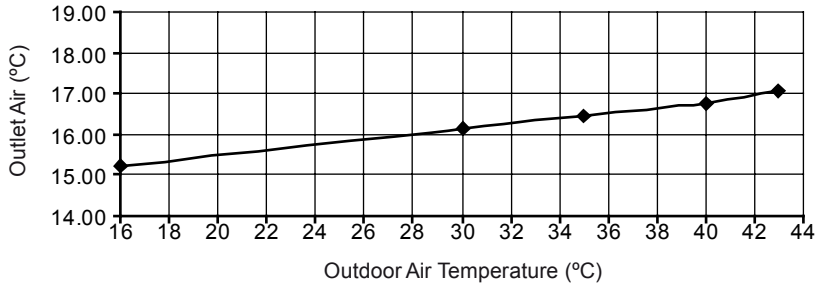
Service data provided are based on the air conditioner running under rated frequency during forced cooling / forced heating mode.

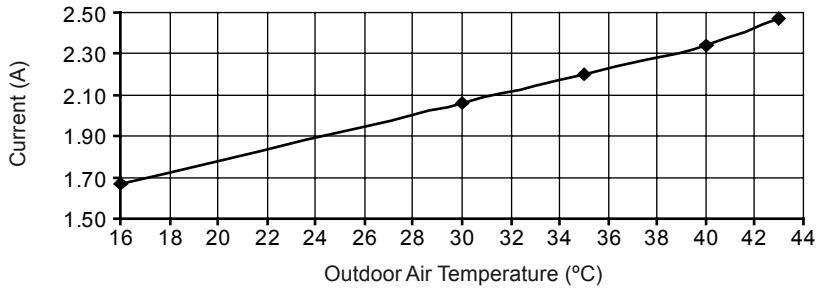
18.1 Cool Mode Outdoor Air Temperature Characteristic

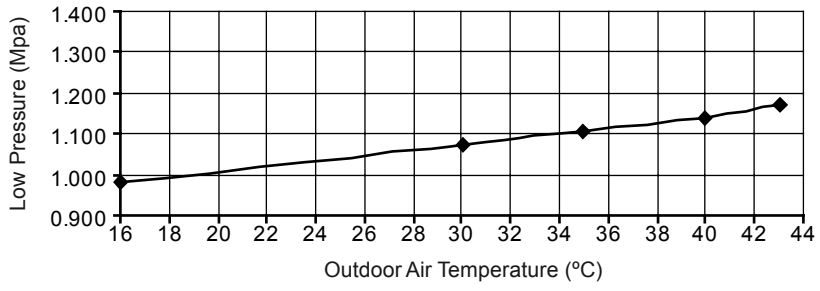
Condition

- Indoor room temperature: 27°C DryBulb/19°C Wet Bulb
- Unit setting: Standard piping length, forced cooling at 16°C, Hi fan
- Compressor frequency: Rated for cooling operation
- Voltage: 230V

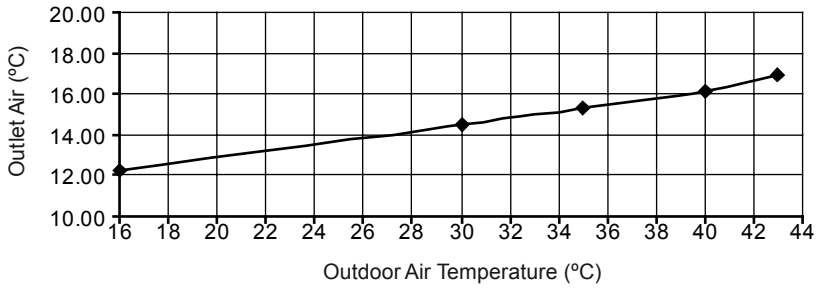
18.1.1 CS-HE9PKE / CU-HE9PKE CS-AE9PKE / CU-AE9PKE

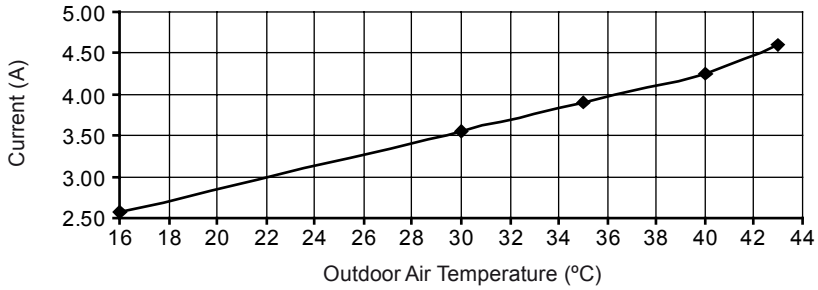


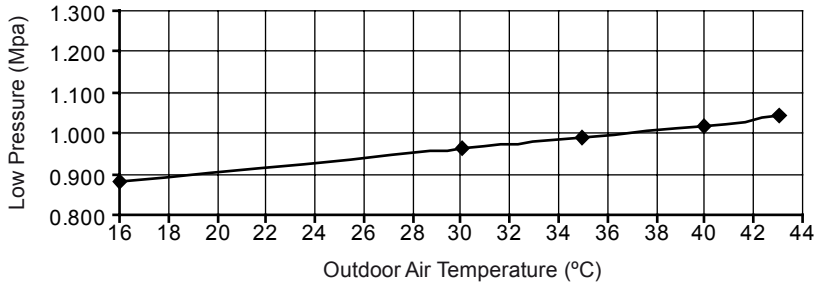




18.1.2 CS-HE12PKE / CU-HE12PKE





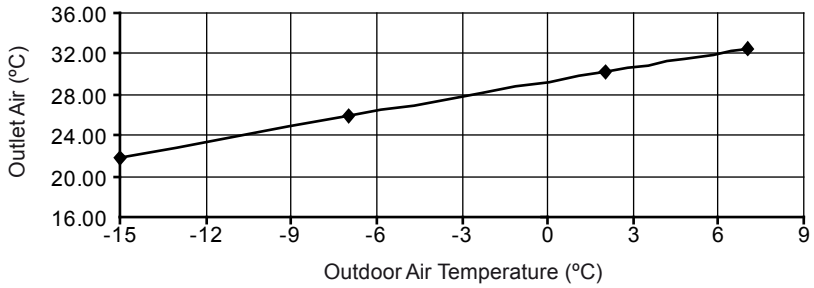


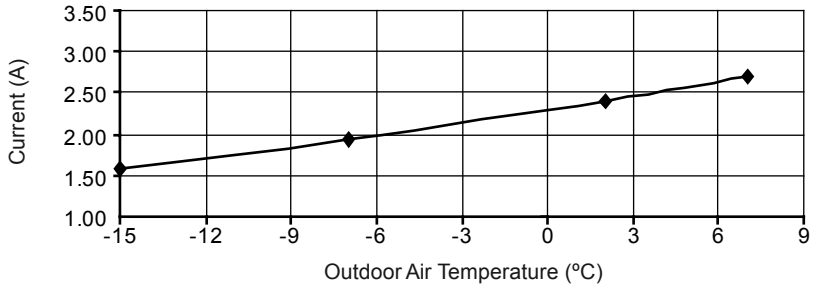
18.2 Heat Mode Outdoor Air Temperature Characteristic

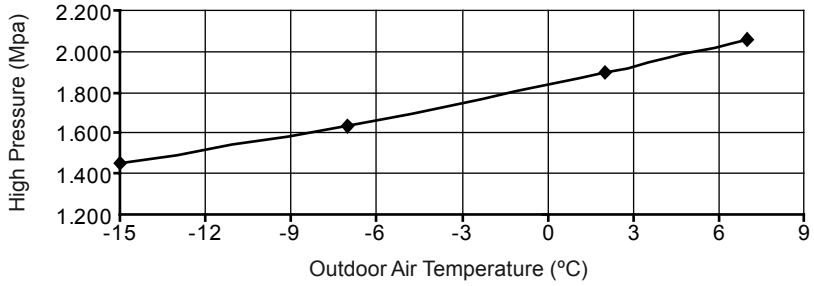
Condition

- Indoor room temperature: 20°C DryBulb/ -°C Wet Bulb
- Unit setting: Standard piping length, forced heating at 30°C, Hi fan
- Compressor frequency: Rated for Heating operation
- Voltage: 230V

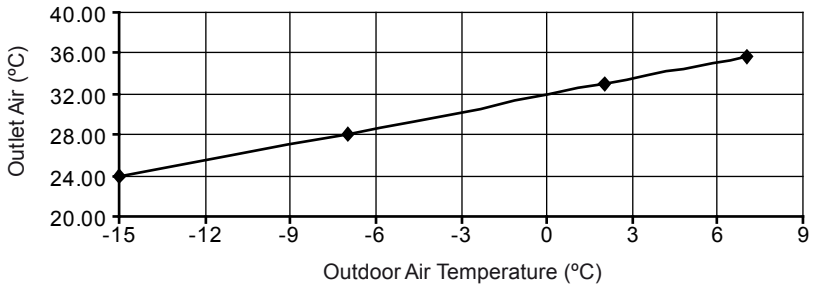
18.2.1 CS-HE9PKE / CU-HE9PKE CS-AE9PKE / CU-AE9PKE

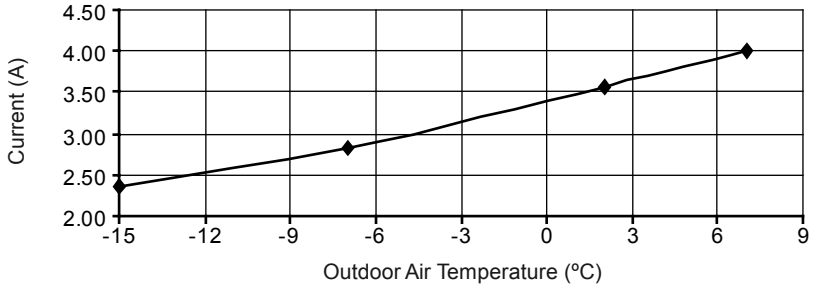


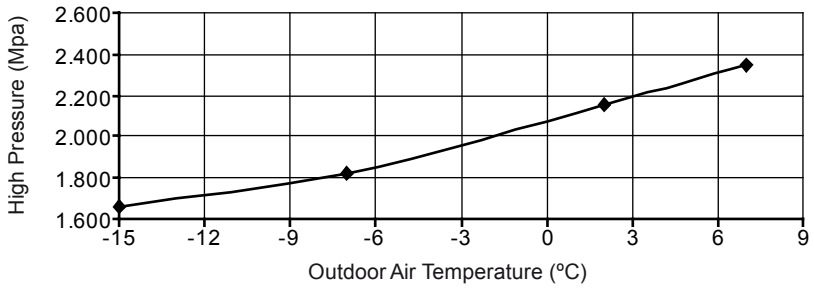




18.2.2 CS-HE12PKE / CU-HE12PKE





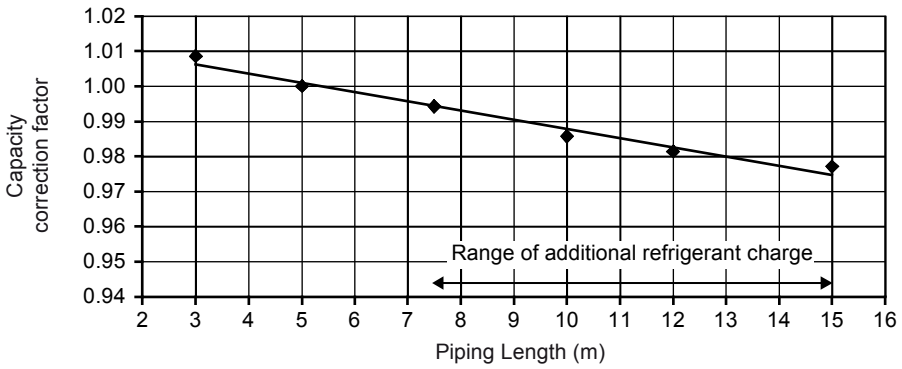


18.3 Piping Length Correction Factor

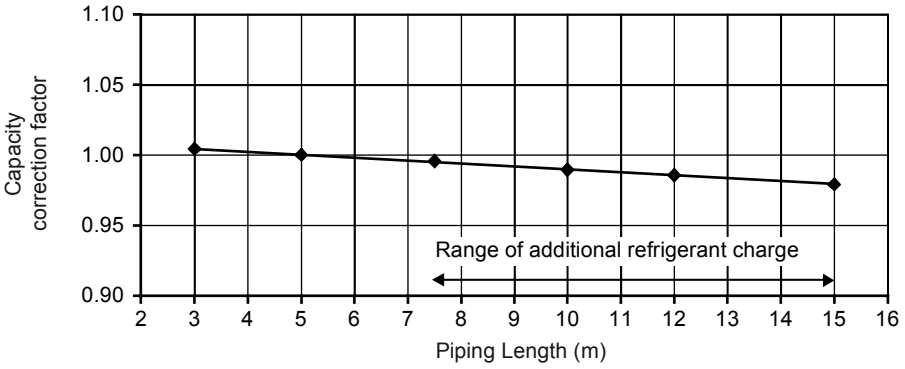
The characteristic of the unit has to be corrected in accordance with the piping length.

18.3.1 CS-HE9/12PKE / CU-HE9/12PKE & CS-AE9PKE / CU-AE9PKE

18.3.1.1 Cooling Capacity



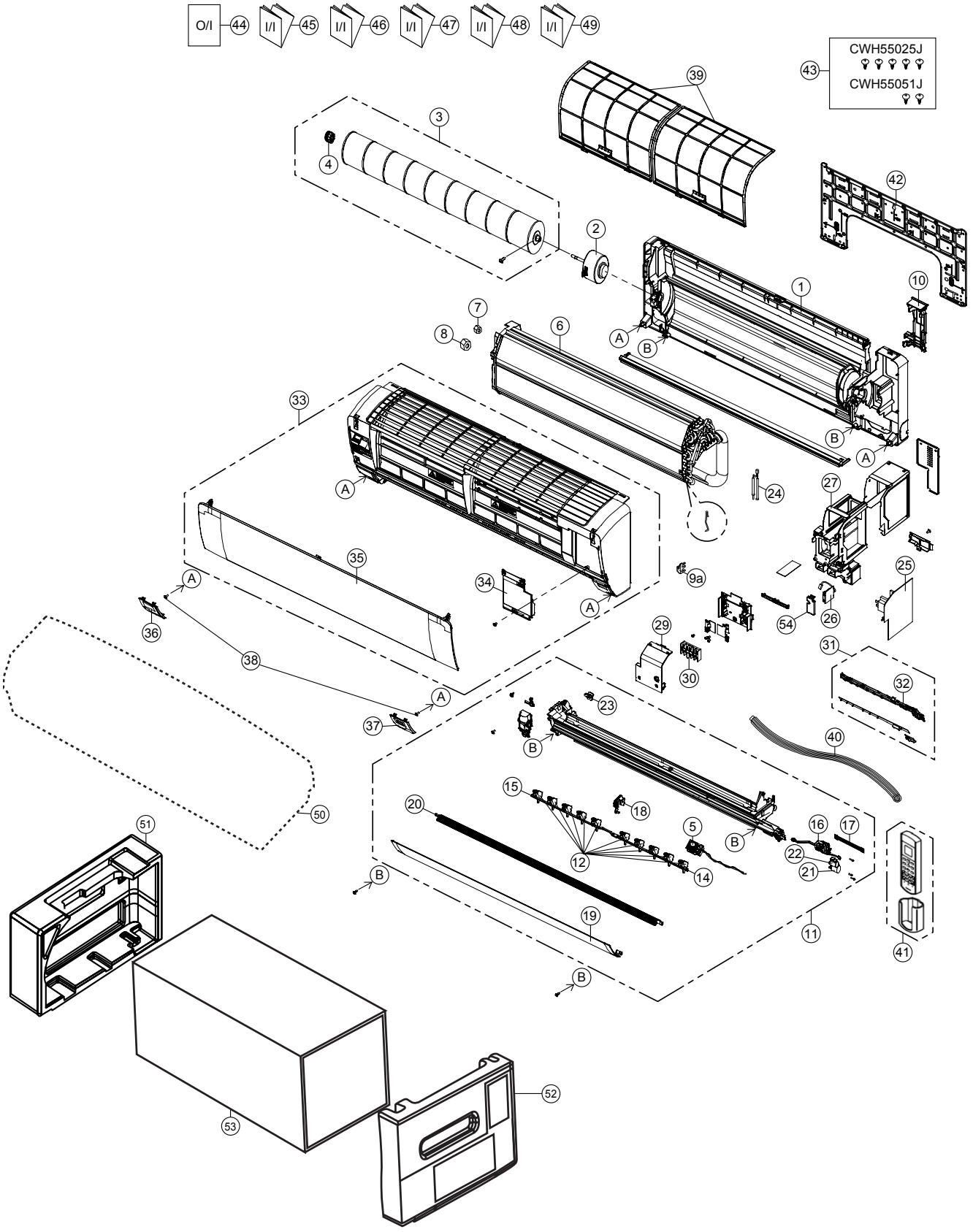
18.3.1.2 Heating Capacity



Note: The graphs show the factor after added right amount of additional refrigerant.

19. Exploded View and Replacement Parts List

19.1 Indoor Unit



Note
The above exploded view is for the purpose of parts disassembly and replacement.
The non-numbered parts are not kept as standard service parts.

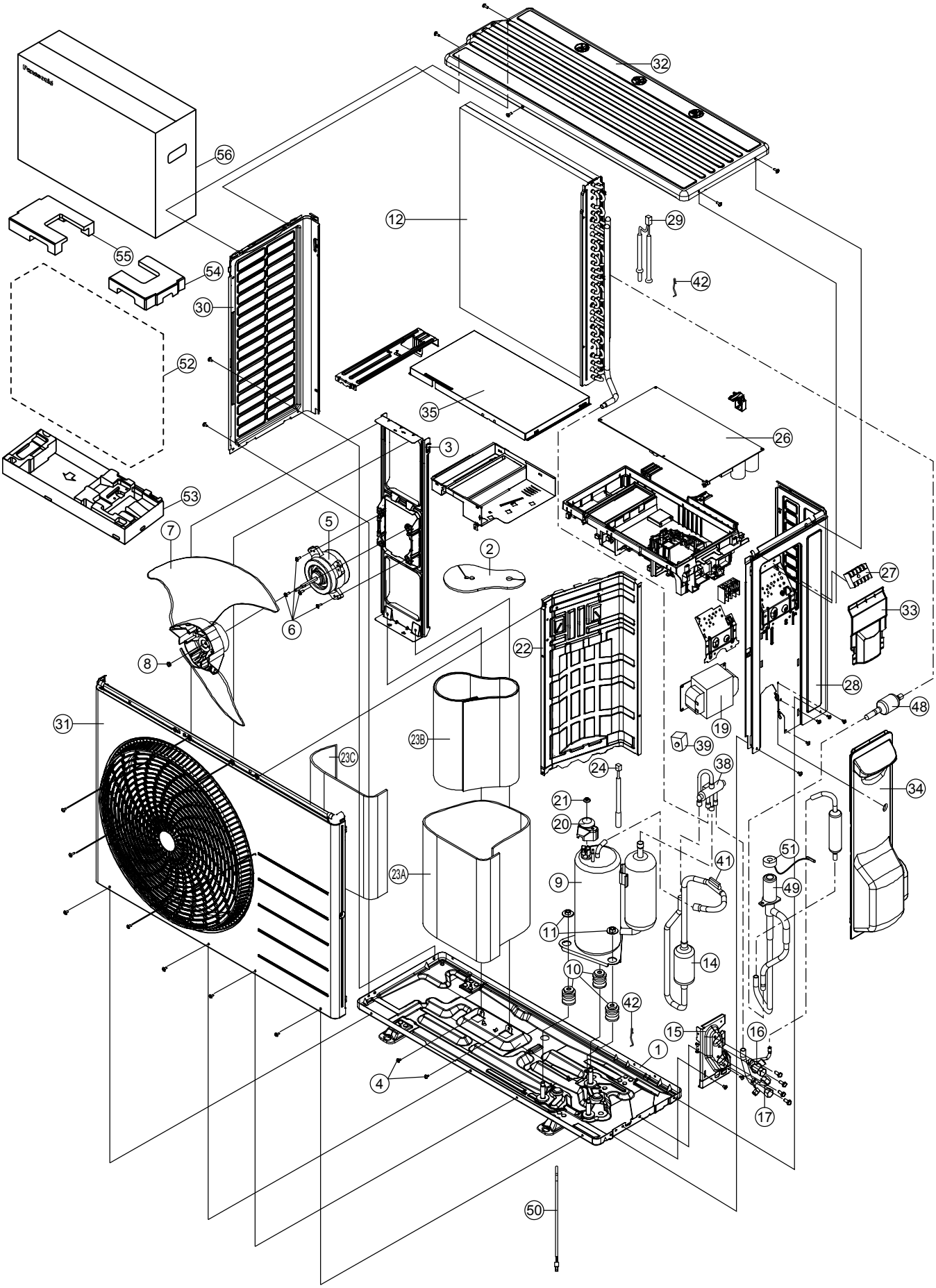
SAFETY	REF. NO.	PART NAME & DESCRIPTION	QTY	CS-HE9PKE	CS-AE9PKE	CS-HE12PKE	REMARK
	1	CHASSY COMPLETE	1	CWD50C1730	←	←	
⚠	2	FAN MOTOR, DC 30W 3PH	1	ARW7676ACCB	←	←	O
	3	CROSS - FLOW FAN CO.	1	CWH02C1137	←	←	
	4	BEARING ASSY	1	CWH64K1010	←	←	O
	5	GENERATOR COMPLETE	1	CWH94C0048	←	←	
	6	EVAPORATOR CO.	1	CWB30C4590	←	←	
	7	FLARE NUT(1/4) (LIQUID)	1	CWT251030	←	←	
	8	FLARE NUT (3/8) (1/2) (GAS)	1	CWT251031	←	←	
	9a	HOLDER SENSOR	1	CWH32142	←	←	
	10	BACK COVER CHASSIS	1	CWD933463	←	←	
	11	DISCHARGE GRILLE COMPLETE	1	CWE20C3305	←	←	
	12	VERTICAL VANE	10	CWE241389	←	←	
	14	CONNECTING BAR	1	CWE261261	←	←	
	15	CONNECTING BAR	1	CWE261262	←	←	
⚠	16	AS MOTOR, DC SINGLE 12V 300 OHM	1	CWA98K1020	←	←	O
	17	LEAD WIRE FOR AIR SWING MOTOR	1	CWA67C8222	←	←	O
	18	FULCRUM	1	CWH621157	←	←	
	19	HORIZONTAL VANE COMPLETE	1	CWE24C1420	←	←	
	20	HORIZONTAL VANE COMPLETE	1	CWE24C1421	←	←	
⚠	21	A.S.MOTOR, DC SINGLE 12V250 OHM	1	CWA981241	←	←	O
⚠	22	A.S.MOTOR, DC SINGLE 12V250 OHM	1	CWA981299	←	←	O
	23	CAP - DRAIN TRAY	1	CWH521259	←	←	
	24	SENSOR COMPLETE	1	CWA50C2401	←	←	O
⚠	25	ELECTRONIC CONTROLLER - MAIN	1	CWA73C7894	←	CWA73C7895	O
⚠	26	ELECTRONIC CONTROLLER - HVU	1	N0GE1F000005	←	←	
	27	CONTROL BOARD COVER CASING	1	CWH102456	←	←	
	29	CONTROL BOARD FRONT COVER CO.	1	CWH13C1286	←	←	
⚠	30	TERMINAL BOARD CO	1	CWA28C2364	←	←	O
	31	INDICATOR COMPLETE	1	CWE39C1231	←	←	O
	32	INDICATOR HOLDER	1	CWD933466	←	←	
	33	FRONT GRILLE COMPLETE	1	CWE11C5432	CWE11C5457	CWE11C5432	
	34	GRILLE DOOR	1	CWE14C1099	←	←	
	35	INTAKE GRILLE COMPLETE	1	CWE22K1605	←	←	
	36	DECORATION BASE ASS'Y (L)	1	CWE35K1135	←	←	
	37	DECORATION BASE ASS'Y (R)	1	CWE35C1182	←	←	
	38	SCREW - FRONT GRILLE	2	XTT4+16CFJ	←	←	
	39	AIR FILTER	2	CWD001326	←	←	O
	40	FLEXIBLE PIPE	1	CWH851173	←	←	
	41	REMOTE CONTROL COMPLETE	1	CWA75C4408	←	←	O
	42	INSTALLATION PLATE	1	CWH361134	←	←	
	43	BAG COMPLETE - INSTALLATION SCREW	1	CWH82C1705	←	←	
	44	OPERATING INSTRUCTION	1	CWF569236	←	←	
	45	INSTALLATION INSTRUCTION	1	CWF615521	←	←	
	46	INSTALLATION INSTRUCTION	1	CWF615522	←	←	
	47	INSTALLATION INSTRUCTION	1	CWF615523	←	←	
	48	INSTALLATION INSTRUCTION	1	CWF615524	←	←	
	49	INSTALLATION INSTRUCTION	1	CWF615525	←	←	

SAFETY	REF. NO.	PART NAME & DESCRIPTION	QTY	CS-HE9PKE	CS-AE9PKE	CS-HE12PKE	REMARK
	50	BAG	1	CWG861515	←	←	
	51	SHOCK ABSORBER (L)	1	CWG713484	←	←	
	52	SHOCK ABSORBER (R)	1	CWG713485	←	←	
	53	C.C.CASE	1	CWG568509	←	←	
⚠	54	ELECTRONIC CONTROLLER - RECEIVER	1	CWA746916	←	←	

(Note)

- All parts are supplied from PAPAMY, Malaysia (Vendor Code: 00029488).
- “O” marked parts are recommended to be kept in stock.

19.2 Outdoor Unit



Note
The above exploded view is for the purpose of parts disassembly and replacement.
The non-numbered parts are not kept as standard service parts.

SAFETY	REF. NO.	PART NAME & DESCRIPTION	QTY	CU-HE9PKE	CU-AE9PKE	CU-HE12PKE	REMARK
	1	CHASSY ASS'Y	1	CWD52K1359	←	←	
	2	SOUND PROOF MATERIAL	1	CWG302742	←	←	
	3	FAN MOTOR BRACKET	1	CWD541167	←	←	
	4	SCREW - FAN MOTOR BRACKET	2	CWH551217	←	←	
⚠	5	FAN MOTOR, DC 40W 3PH	1	ARS6411AC	←	←	O
	6	SCREW - FAN MOTOR MOUNT	4	CWH55252J	←	←	
	7	PROPELLER FAN ASSY	1	CWH03K1066	←	←	
	8	NUT - PROPELLER FAN	1	CWH56053J	←	←	
⚠	9	COMPRESSOR	1	5RD132XBE21	←	←	O
	10	ANTI - VIBRATION BUSHING	3	CWH50077	←	←	
	11	NUT - COMPRESSOR MOUNT	3	CWH561096	←	←	
	12	CONDENSER COMPLETE	1	CWB32C3547	←	←	
	14	DISCHARGE MUFFLER	1	CWB121010	←	←	
	15	HOLDER - COUPLING	1	CWH351233	←	←	
	16	2-WAYS VALVE (LIQUID)	1	CWB021589	←	←	O
	17	3-WAYS VALVE (GAS)	1	CWB011374	←	←	O
⚠	19	REACTOR	1	G0C193J00004	G0C193J00016	←	
	20	TERMINAL COVER	1	CWH171039A	←	←	
	21	NUT - TERMINAL COVER	1	CWH7080300J	←	←	
	22	SOUND - PROOF BOARD	1	CWH151273	←	←	
	23A	SOUND PROOF MATERIAL	1	CWG302741	←	←	
	23B	SOUND PROOF MATERIAL	1	CWG302745	←	←	
	23C	SOUND PROOF MATERIAL	1	CWG302740	←	←	
	24	SENSOR - COMPLETE	1	CWA50C2894	←	←	O
⚠	26	ELECTRONIC CONTROLLER - MAIN	1	CWA73C7962R	←	CWA73C7963R	O
⚠	27	TERMINAL BOARD ASS'Y	1	CWA28K1036J	←	←	O
	28	CABINET SIDE PLATE CO.	1	CWE04C1481	←	←	
	29	SENSOR - COMPLETE	1	CWA50C2893	←	←	O
	30	CABINET SIDE PLATE (L)	1	CWE041616A	←	←	
	31	CABINET FRONT PLATE - CO.	1	CWE06C1441	←	←	
	32	CABINET TOP PLATE	1	CWE031148A	←	←	
	33	PLATE - C.B.COVER	1	CWH131470A	←	←	
	34	CONTROL BOARD COVER - COMPLETE	1	CWH13C1253	←	←	
	35	CONTROL BOARD COVER	1	CWH131473	←	←	
	38	4-WAYS VALVE	1	CWB001063	←	←	
⚠	39	V-COIL COMPLETE - 4-WAY VALVE	1	CWA43C2431	←	←	
	41	HOLDER - SENSOR	1	CWH32075	←	←	
	42	HOLDER - SENSOR	2	CWH32143	←	←	
	48	STRAINER	1	CWB11094	←	←	
	49	EXPANSION VALVE	1	CWB051055	←	←	
	50	BASE PAN HEATER	1	CWA341072	←	←	
⚠	51	V-COIL COMPLETE - EXP. VALVE	1	CWA43C2257	←	←	
	52	BAG	1	CWG861078	←	←	
	53	BASE BOARD / CC CASE - COMPLETE	1	CWG62C1162	←	←	
	54	SHOCK ABSORBER (RIGHT)	1	CWG713415	←	←	
	55	SHOCK ABSORBER (LEFT)	1	CWG713416	←	←	

SAFETY	REF. NO.	PART NAME & DESCRIPTION	QTY	CU-HE9PKE	CU-AE9PKE	CU-HE12PKE	REMARK
	56	C.C.CASE	1	CWG566848	←	←	

(Note)

- All parts are supplied from PAPAMY, Malaysia (Vendor Code: 00029488).
- “O” marked parts are recommended to be kept in stock.

Printed in Malaysia
SB0713-0